MAY, 1953

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GYNECOLOGY AND OBSTETRICS

Section

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INTERNATIONAL ABSTRACTS OF SURGERY

VOLUME 96 MAY, 1953 NUMBER 5

COLLECTIVE REVIEW

COLONIC AND ANORECTAL FUNCTION AND DISEASE

ROBERT TURELL, B.S., M.D., F.A.C.S., New York, New York, JOSEPH S. KRAKAUER, M.D., Paterson, New Jersey, and AUBRE de L. MAYNARD, B.S., M.D., F.A.C.S., New York, New York

CANCER (*continued*)

Care. Preoperative considerations. The main purpose of the preoperative care is to prepare the patient so as to render him or her safe for surgery. This frequently requires an expert knowledge of the swiftly changing concepts of physiology and biochemistry, and is best carried out by a group of clinicians rather than by the surgeon alone.

Nutrition. Protein deficiency must be combated as the malnourished person faces a very serious handicap consisting in lessened prospects of survival after a major operation or a protracted period of convalescence with interference of the healing of the wounds. Ravdin and his associates (287) have shown that lost protein must be replaced and that protein must be protected by additional calories. The protein and caloric intake must be integrated, about 30 calories per kilogram of body weight is required while roughly about 2.5 gm. of protein per kilogram of body weight (402) are required. Parenthetically, the average healthy person eats approximately 15 to 25 per cent of protein; 45 to 75 per cent in carbohydrates and 30 to 40 per cent in fat of his or her daily caloric requirements. The quality of protein as to its digestibility and its contents of essential amino acids is of importance (287); proteins of animal origin are vastly superior to vegetable proteins as they contain a greater concentration of the important amino acids. The effect of trauma incident to a major operative procedure on protein nutrition must always be anticipated because a negative nitrogen exchange usually occurs after an operation even of a well nourished, previously healthy person. The cause of this phenomenon is a matter of dispute. The maintenance of a dynamic protein equilibrium requires many of the component amino acids of complete proteins.

A patient with colonic cancer very often shows anemia and hypoproteinemia. In the past anemia was studied by determining the values of hemoglobin, the hematocrit readings, and the total protein per 100 c.c. of plasma. Preoperatively, a hematocrit of 42 and a total protein of 7 gm. or more per 100 c.c. of plasma are required (384). Recently, it has been shown that because of considerations of hemodilution, hemoconcentration, and related factors, total blood volume or red blood cell mass determinations are more accurate indexes of the foregoing deficiencies and better guides for effective therapy.

Anemia and hypoproteinemia are combated by an integrated program of oral feedings of protein and the parenteral administration of blood and blood substitutes. Transfusions of whole blood or of washed red blood cells are par excellence for the existing anemia or the deficiency of circulating red blood cells, but give poor substances for protein synthesis; for the latter protein is needed. The history of blood transfusion was well described by Lewisohn, the originator of the citrated method of transfusion (214). Incidentally, the indiscriminate use of blood transfusions should be discouraged largely because of the need of conservation of blood and the occurrence of reactions

This is a continuation from the April issue.

such as homologous serum jaundice (135), depression of erythropoiesis, polycythemia, and hemolytic or pyrogenic reactions (338).

Plasma proteins, although they carry the risk of cardiovascular complications and are delayed in metabolization, are nevertheless capable of supporting the protein economy for some time in the dog as well as in man (287). Of the plasma substitutes only osseous gelatin is a worthwhile and available protein.

Protein hydrolysate and amino acid, usually administered intravenously, are useful in the nutrition of patients who cannot or refuse to eat and who cannot take a sufficient amount of food by mouth. The hydrolysates that are prepared by acid hydrolysis also contain tryptophane and methionine. Most of these products are bottled with dextrose for its protein-sparing capacity and for its caloric value. Less than 2 gm. of salt is added to each 50 gm. of amino acid.

Rice and his associates (296) have shown that adequate daily carbohydrate, amino acids, and calories without excessive hydration of the patient can be provided from 3,000 c.c. of an intravenously administered solution containing dextrose (5 per cent), amino acids (5 per cent), and alcohol (7.5 per cent). Of course, to this solution electrolytes and vitamins may be added as desired. Incidentally, this alcohol solution provides sedation and some analgesia which have additional value in the preoperative and postoperative control of the patient. More recently, these authors (297) have developed an ideal solution which contains 1 calory for each cubic centimeter, making the numerical figures for the caloric and fluid intake the same. This solution contains 6 per cent of amino acids, 5 per cent of ethanol, and 12 per cent of invert sugar. The usefulness and safety of invert sugar have been established by Weinstein (384). The invert sugar is an acid hydrolysate of cane sugar; each molecule is broken down into one molecule of dextrose and one molecule of fructose. The amino acids are from the enzymatic digest of bovine plasma or the acid hydrolysate of casein. Absolute ethyl alcohol is utilized. The average patient receives about 2,500 c.c. of this solution per 24 hours. Blood sugar levels usually do not exceed the renal threshold and rise as high during the course of intravenous infusions as when dextrose is administered in small quantities. Nitrogen balance studies yielded favorable results, and water balance investigations showed that the average gain in weight was not caused by water retention; neither oliguria nor polyuria has been observed. In short, infusion of this solution provides full nutritional and fluid requirements without overhydration of the patient. As already indicated, vitamins and electrolytes such as sodium and potassium may be added. The recommended daily dose of vitamins is 500 to 1,000 mgm. of vitamin C, 20 to 40 mgm. of thiamin, 5 to 20 mgm. of riboflavin, and 100 to 200 mgm. of niacin (384). This may be given as a panvitamin capsule or solution. Vitamin K is also necessary, especially during the course of the bowel preparation with sulfonamides or antibiotics.

The safety of repeated intravenous administration to patients of properly prepared fat emulsions which are utilized well for energy purposes has been established (321, 260). This is an excellent means of parenteral nutrition for the patient requiring calories for rapid utilization without delay as well as for the person with inanition (320). Orally administered fat emulsions have also been shown to be of value (*J. Am. M. Ass.*, 1952, 150: 1665).

It is generally conceded by all authors that the oral route of feeding is superior to the parenteral one because it is easier, cheaper, and safer. Also, for as yet an undetermined reason, the same amount of nitrogen absorbed from the alimentary tract produces a slightly greater nitrogen retention than when it is administered intravenously. Patients with colonic cancers usually require a palatable diet containing about 3,000 calories including about 150 gm. of protein per 24 hours. These patients do well on small feedings taken at frequent intervals of time.

Irrigations. An empty colon is a prerequisite to all forms of colonic surgery. This can be accomplished by means of daily irrigations or saline cathartics in conjunction with the use of sulfonamide or antibiotic agents. Theoretically, there should be no need for the cleansing agents after their initial employment prior to the institution of colonic antiseptic therapy. However, because of human frailties in carrying out orders the use of a daily colonic irrigation affords additional safety and assurance.

Intubation. In the absence of a proximal vent in the colon it is desirable to intubate the small bowel about 12 to 24 hours prior to operation. Incidentally, this maneuver reduces the small bowel to a small, easily manipulable mass which can be packed off from the operative field with ease.

The complications of gastrointestinal intubation (sinusitis, otitis media, stricture of the esophagus, rupture of esophageal varices, obstruction of the larynx, rupture of the intestine, knotting of the tube, and inability to withdraw tube)

are well discussed by Chaffee (73). Knotting of the tube should be suspected when intestinal drainage is unsatisfactory. Rupture of the intestine may be avoided if the position of the tip of the tube is changed daily. Inability to withdraw a balloon-tipped tube may result from occlusion of the air conduit to the bag. Patency of the air channel and free communication with the balloon should be checked every day.

Intestinal antiseptics. The place of intestinal antisepsis in the preparation of the colon for surgery is discussed elsewhere in the text.

Considerations during operation—Blood transfusion. It has been estimated that during an abdominoperineal resection of the rectum a loss of some 1,500 c.c. of blood occurs (210, 309). Duration of the operation and carelessness about hemostasis are of importance in this regard. It is now axiomatic to replace blood lost during the performance of any major operation in order to prevent secondary clinical shock which may be brought about by 25 to 40 per cent loss of the circulating blood volume (216). At the same time one should guard against transfusing too much blood lest pulmonary edema, circulatory overload, and other undesirable effects develop. Salzstein (309) has attributed the death of several of his patients to overtransfusion. (Also read *N. England J. M.*, 1952, 247:675.)

Fluids in the form of a 5 per cent dextrose solution in distilled water may also be given during the time of operation.

Anesthesia. A consideration of this important subject is beyond the scope of this review. Suffice it to say that the emergence of the physician-anesthetist has been a boon to the patient and the surgeon. The problem of anesthetic agents, anoxia, regurgitation, and pulmonary aspiration are largely the concern of the anesthetist. The value of hypotensive spinal anesthesia for radical surgery has been discussed (152a).

Postoperative considerations—Nutrition. The discussion of the various aspects of nutrition pertaining to the preoperative course of preparation of the patient apply with greater emphasis to the postoperative management. Excellent nutrition should be provided even though the average patient can withstand a temporary period of starvation. It should be recalled that after a major rectal or colonic operative procedure the patient is in negative caloric, fluid, and nitrogen balances because of the inadequate intake of food, increased loss of nitrogen through the kidneys and exudates, and inadequate digestion, absorption, and utilization of foods. The restoration of deficiencies may call for many methods of replacement.

Sodium chloride. The normal intake and urinary excretion of this element varies from 2 to 4 gm. per 24 hours or 250 to 500 c.c. of normal saline (216). The requirements of sodium chloride are altered in the face of renal disease and consequent inability of the kidneys to retain sodium, or in the presence of extensive external loss of sodium-containing body fluids. Because of the presence of impairment of the renal blood flow during an operation and the postoperative likelihood toward transient retention of sodium, as observed long ago by Coller and others, no saline solution should be administered to patients during the operation and the subsequent 2 or 3 days after operation. In the presence of a significant loss of extracellular fluid during this 3 day period, it should be replaced with a solution containing 0.5 per cent of sodium chloride and 5 per cent dextrose. It should be kept in mind that the kidney may retain sodium and yet excrete chloride in nearly normal amounts so that the patient's need for sodium may be quantitatively quite different from his need for the chloride "ion" (216).

An important article on water intoxication in surgical patients in whom there was a definite depletion of the chloride level appeared recently; the serum chloride was as low as 75 mEq per liter in some of the patients (the normal being 100 mEq/L) (401a). Sudden convulsive seizures occurring from 12 to 48 hours after operation and intracellular edema caused by excessive dilution of the extracellular fluids and lack of sodium chloride have been reported. These seizures can be prevented by the avoidance of excessive amounts of dextrose solution during operative procedures and during the days immediately after the operation and by the administration of judicious amounts of salt. A question is pertinently raised whether it would not be wiser to administer 4.5 to 9 gm. of salt the day after operation rather than to withhold sodium chloride during the first postoperative day; such a policy would also prevent giving considerable amounts of salt-free dextrose solutions during the immediate postoperative period when the patient supposedly cannot tolerate this load. The treatment of this complication is the administration of hypertonic saline solution (2%). Diuresis usually occurs when sufficient saline has been given. Patients in whom irreversible changes have not yet occurred usually recover fairly rapidly.

Whenever possible fluids should be administered by the oral route; the patient's taste for salt is a better guide than theoretic calculations.

Two new types of electrolyte replacement solution have been described (174a): (1) a gastric solu-

tion containing, per liter, 3.7 gm. (63 mEq.) of sodium chloride, 1.3 gm. (17 mEq.) of potassium chloride, and 3.74 gm. (70 mEq.) of ammonium chloride with 100 gm. of dextrose, and (2) an intestinal solution consisting of 5.1 gm. (88 mEq.) of sodium chloride, 0.9 gm. (12 mEq.) of potassium chloride, and 5.6 gm. (50 mEq.) of sodium lactate with 100 gm. of dextrose. The gastric solution replaces the losses incurred through gastric suction or vomiting, and provides chloride in excess of sodium with 17 mEq. of potassium to prevent the occurrence of metabolic extracellular alkalosis which in turn leads to intracellular potassium depletion. The intestinal solution replaces the losses sustained through intestinal suction or biliary or pancreatic drainage, and provides sodium in excess of chloride with 12 mEq. of potassium, thus preventing the occurrence of metabolic acidosis. This therapy is well tolerated and may be combined with additional nutritional parenteral therapy (82a).

Salt therapy in hypoproteinemic patients who hold extra water in the extracellular spaces is better accomplished by meeting the protein deficit with transfusions of blood or blood substitutes than by simply withholding salt and thus allowing the sodium level to fall to normal.

The terminology of the electrolytic elements is now undergoing a change from expression in terms of milligrams per 100 c.c. of fluid to milliequivalents per liter just as the metric system in gravimetric and volumetric expression is superseding the apothecary's system.

Potassium. The student of colonic disease became keenly aware of the clinical importance of the element potassium in 1945 when Darrow (86a) showed low levels of potassium in the serum of infants with diarrhea and the migration of intracellular potassium to the extracellular spaces. Subsequent studies by Darrow (87) and his associates on the loss of body potassium in excess of body nitrogen in infantile diarrhea have a bearing on the problem under discussion and will be detailed here. They showed that (1) the amount of intracellular sodium may be slightly high during hydration; (2) administration of sodium chloride without sodium bicarbonate should suffice to restore deficits of sodium and chloride; (3) acidosis is explained by the deficit of potassium which leads to the transfer of extracellular sodium into the cells during dehydration; (4) fluids used to replace deficits of water and electrolytes in diarrhea should contain potassium as well as sodium and chlorides, and (5) the administration of sodium bicarbonate without potassium salts in acidosis is likely to aggravate the cellular abnormality and produce alkalosis and a low concentration of potassium in the blood serum. A disturbance of the balance can be restored by the administration of potassium. In recent years there have appeared a host of papers on potassium in health and disease (35, 110, 115, 229, 284, 316, 323).

Accurate potassium studies have been made by the recent development of the flame photometer. In the absence of this instrument the status of the plasma potassium can be established by means of an electrocardiogram. The normal concentration of potassium in the plasma and the interstitial fluid varies from 4 to 5 milliequivalents per liter. This element is the principal intracellular cation, over 95 per cent of which is stored within tissue cells and red blood cells in a concentration of approximately 150 to 160 milliequivalents. Two-thirds of the intracellular potassium is bound to protein and does not diffuse. The remaining one-third passes freely in and out of cells.

The normal intake and excretion of potassium per day is approximately 3 to 4 gm., or 75 to 100 milliequivalents. It is absorbed from the intestine and delivered by the circulating blood to the cells and to the kidneys. Almost all of the ingested potassium, except for small amounts needed for the growth of new cells, is excreted in the urine; some is also excreted in the feces and perspiration.

Depletion of potassium may occur as a result of (1) a diminished intake because of vomiting, intestinal obstruction, or following surgical procedures; (2) an increased output as in vomiting, diarrhea, intestinal fistulas (the losses under these circumstances are much greater than normally), or intestinal intubation during intravenous infusions of dextrose and/or saline and by the use of certain drugs such as epinephrine, corticotropic hormone (ACTH), and cortisone; (3) dehydration; (4) malnutrition; and (5) postoperative states. Hypopotassemia may also occur as a result of the shift from plasma to cells during nitrogen carbohydrate anabolism.

Clinically, a moderate deficiency may be suspected in the presence of dehydration, languor, chronic ileus, edema, oliguria, loss of strength and energy, and inability to eat proper amounts of food. Tachycardia is the rule although bradycardia may occur rarely. Breathing becomes shallow and rapid and may result in respiratory paralysis. Low plasma concentration may show distinct electrocardiographic changes, namely, prolongation of the Q-T interval; decrease in amplitude of the T wave, which becomes inverted; sagging of the S-T segment, and depression of the S-T take-off. They are the apposite signs seen in potassium intoxication.

Treatment, whenever possible, should consist of the replacement of potassium by mouth, otherwise the element, in the form of chloride and phosphates ion, should be administered parenterally. The food may be reinforced by the addition of from 80 to 125 milliequivalents (3 to 5 gm.) of the element to each liter of milk or fruit juices. Oral therapy is quite safe in the presence of an adequate urinary output.

For intravenous therapy a sterile solution of potassium chloride is usually employed. The required amount is usually added to a liter of dextrose or isotonic saline solution and is administered slowly by continuous intravenous infusion; the amount infused should not exceed 20 milliequivalents per hour. Approximately 3.5 milliequivalents per kilogram of body weight per day may be given safely, or 1 to 3 gm. of potassium salts per liter are given at the rate of 8 c.c. (about 120 drops) per minute. Caution is necessary so as not to cause a concentration of potassium in the plasma above 7 milliequivalents per liter which may cause heart block. Plasma concentrations greater than 5.3 milliequivalents per liter, which are regarded as the upper limit of normal, are contraindications to potassium therapy. Therefore, prior to the administration of potassium the plasma level should be determined. Patients with poor urinary excretion (renal insufficiency, oliguria, or anuria) are poor candidates for potassium therapy because poor excretion may produce elevated plasma levels of potassium. The simultaneous administration of glucose helps to accelerate the passage of potassium into the tissues, and saline solutions help to combat dehydration as well as to re-establish the normal flow of urine. These solutions plus calcium gluconate administered intravenously are effective against the toxicity produced by potassium. Potassium therapy is, of course, contraindicated in the presence of conditions in which the blood potassium levels are already high, such as acute dehydration, or on the first day after an operative procedure. Lockwood and Randall believe that the inclusion of 5 milliequivalents per liter or of 0.04 per cent in all parenteral fluids might be a practical and an effective measure against the development of potassium deficiency in surgical patients.

Nasogastric suction. This is maintained after major rectal surgery or colonic resections for several days or until the patient passes gas per rectum or the colonic stoma, when the preoperatively introduced tube is removed and oral feeding is started.

Blood. If the patient was rehabilitated well before operation and the blood lost during operation was replaced at the time of the operation, there usually is no need for further blood transfusion.

Ambulation and type of incision. Early ambulation, namely, the day of the operation or the following day, is practiced (208). It is not enough to get the patient out of bed and have him sit in a chair; he should move about the room or corridors. Coller (343) and his associates believe that when early ambulation is combined with the employment of the transverse abdominal incision there is a lowering of the incidence of all postoperative complications and a shortening of the patient's postoperative sojourn in the hospital. They believe that the transverse incision is the most physiologic surgical approach to the peritoneal cavity, and is safer for early deep breathing, coughing, and bed exercises. The incidence of wound dehiscence or separation is definitely lower than that following the use of vertical incisions. Of interest is the conclusion reached by Hawk and Oser (157) that "there may be no parallel drawn between the relation of wound disruption to sex, age, cancer, obesity, pre-evisceration complications, day of disruption, suture material, hypoproteinemia, vitamin deficiencies, and the preoperative and postoperative courses. Proper closure of the peritoneum is essential in preventing small defects." Wolff (393) is in agreement only with the last thought and disagrees with most of the remaining ideas.

Postoperative venous thrombosis. Ochsner and his associates (265) have introduced alpha tocopherol (epsilan M) for the treatment of postoperative venous thrombosis. At the time of writing their article they administered alpha E tocopherol orally in dosages of 200 international units every 8 hours. If the patient cannot take the medication by mouth, alpha tocopherol phosphate (epsilan phosphate) is administered intramuscularly in dosages of 100 mgm. every 8 hours with 10 c.c. of 10 per cent solution of calcium gluconate given intravenously every 24 hours. Leithauser (208) believes that early ambulation and specific leg exercises have solved the problem of postoperative embolic complications of his patients. The value of trypsin as an anticoagulant drug has been challenged (unpublished data).

Myocardial infarction. The administration of blood or parenteral fluids, anemia, or the type of anesthesia do not appear to be correlated with the occurrence of myocardial infarction following any type of major surgery (401a). Postoperative myocardial infarction with coronary artery occlusion cannot readily be predicted clinically, but should be anticipated in patients known or suspected to have disease of the coronary arteries. To prevent

coronary occlusion the anesthetist must avoid anoxia, and the surgeon must aim to reduce the operative time, to avoid hemorrhagic or surgical shock, and to prevent or effectively control noncardiovascular complications. Whenever myocardial infarction occurs it should be diagnosed and treated with dispatch.

Lower nephron nephrosis. This relatively new term is encountered in the recent surgical literature. This syndrome may occur as a result of peritonitis or a blood transfusion reaction, and is characterized by oliguria and anuria of from 5 to 10 days' duration. The tubules of Henle or the lower nephron is unable to reabsorb the water normally filtered from the blood by the glomerulus. During this time enough fluids should be administered to replace the insensible loss or that occurring as a result of suction, and the patient is observed and treated symptomatically. However, when normal renal function returns excessive amounts of water and sodium may be excreted in a short period of time so as to produce shock and require electrolytic replacement on short notice (309).

Biochemistry in colonic obstruction. Grahame (145), unable to find any literature dealing with the biochemical changes of colonic obstruction in man, studied this problem in 40 consecutive patients with obstruction of the colon due to cancer before operation and for 3 days after operation. He found that the chemical changes in the blood occurring in acute obstruction of the colon depend on the presence or absence of distention of the small bowel and the associated vomiting. Lowered plasma volume due chiefly to the lack of albumin and water was discernible in acute colonic obstruction uncomplicated by marked small bowel distention and vomiting. On the other hand, in the presence of concomitant small intestinal distention, a lowered plasma volume, great loss of chloride and albumin, and an elevated level of plasma potassium were present. Elevated nonprotein nitrogen and potassium levels in acute colonic obstruction with distention of the small bowel suggest that kidney failure may be an important factor in the cause of death in these patients.

Paralytic ileus. One of the latest therapeutic suggestions to relieve paralytic ileus is the intramuscular administration of the soluble calcium salt of pantothenic acid—calcium panthonate. Pantothenic acid is a component of the coenzyme for acetylation concerned in the formation of acetylcholine. The dosage of this agent is 0.050 gm., and one to three doses may be required before flatus is passed (184). Some patients who responded poorly or not at all to other accepted drugs have responded dramatically to calcium panthonate; this promises to be a useful agent for postoperative abdominal distention.

Treatment of cancer of the rectum and colon is based on the results of the basic studies discussed in the foregoing pages.

Colonic cancer. For cancer of the cecum and right colon proximal to the hepatic flexure, ileocolectomy with dissection and ligation of the ileocolic and right colic vessels at their origin should be performed (153). For cancer in the hepatic flexure and the adjacent transverse colon, all branches of the middle colic vessels should be ligated. The ileum should be anastomosed well to the left of the midtransverse colon. Peritonealization of the right posterior abdominal wall may be omitted (89).

Cancer of the transverse colon also requires ligation of the middle colic vessels and their branches. Both the hepatic and splenic flexures are freed, if necessary. The possibility of lateral spread is reduced or offset by wide intestinal resection. Resection should be correspondingly wide for lesions of the distal transverse colon and the splenic flexure as the lymphatic spread may occur along the middle and left colic vessels. The omentum, transverse mesocolon, and gastroepiploic lymph nodes should be resected. Cancer of the splenic flexure may metastasize to the nodes of the hilum of the spleen which necessitates splenectomy (89).

Cancer of the descending colon and sigmoid also spreads laterally when direct drainage is blocked, which necessitates extensive intestinal resection. Under these circumstances, the sigmoidal and left colic vessels are sacrificed, and in most cases also the superior hemorrhoidal circulation is sacrificed by severance of the inferior mesenteric artery at the aorta. This would involve a left colectomy with anastomosis of the midtransverse colon with the rectum. Such an extensive operation is certainly justified in the presence of metastases to the regional lymph nodes as observed upon removal of the specimen by a reliable pathologist. However, Welch and Giddings (386), after a study of their 205 cases of cancer of the left colon, concluded that a left colectomy with the removal of the inferior mesenteric vessels and their tributaries is not a justifiable routine operation. Their reasoning is as follows: 152 of their 205 patients had no involvement of the lymph nodes; consequently these patients did not require this extensive surgical procedure. For the 53 patients with nodal metastasis, a 55 per cent survival, or that of the patients with uninvolved nodes, is the best percentage that could be anticipated. This means

that only 29 patients could have survived if all metastatic lymph nodes could have been removed. Actually, 14 patients lived for 5 years, so it is probable that 15 more persons might have lived following more radical resections. However, to save these 15 patients the radical operation would have been necessary for the entire group of 205 with the probability that postoperative complications would have largely, if not totally, counterbalanced the gain (386).

The preponderance of opinion favors primary resection with the immediate open end-to-end type of anastomosis for nonobstructive, nonperforated tumors of the colon (301), although primary resection and aseptic anastomosis continues to be favored by some surgeons (53). The descending colon and splenic flexure can nearly always be mobilized so that the anastomosis may be done outside of the abdomen (238). One-stage resection of the colon with immediate re-establishment of intestinal continuity is regarded as a boon to the patient and surgeon (301). The significant arguments in favor of the open type of anastomosis are the established safety as based not on theory but on the actual performance of many open anastomoses by experienced and younger surgeons, the precision and accuracy with which sutures may be placed, and, especially, the opportunity that is afforded for the direct inspection of the lumen of each limb of the transected colon before re-establishment of continuity of the bowel. Thus, the character of the bowel adjacent to the removed neoplasm can be scrutinized, and the presence of adenomas that may have been overlooked or obscured by the cancer may thus be detected.

Experimental studies and clinical experience with a single-layer anastomosis of the colon have recently been reported (122). Its simplicity is said to make it possible for the occasional surgeon to acquire skill and confidence in this procedure.

The results of the application of free peritoneal grafts to anastomoses of the colon on 16 dogs have been recorded (74). The grafts remained viable and did not produce constriction at the anastomotic site.

Gunkler and Pearse (155) believe that there is usually no need for the construction of a complementary proximal vent in resection and anastomosis of an unobstructed lesion of the colon. Some surgeons, however, disagree with this thought and routinely perform a simple tube cecostomy to avoid any possible tension on the suture line, and to be ever ready with a proximal vent in the event of an inadvertent complication, e.g., cellulitis or a leak at the suture line.

The operation of obstructive resection still remains a useful operative procedure, and should not be supplanted. Garlock and Klein (124) believe that obstructive resection is preferable to primary anastomosis in the following four situations: (1) great disproportion in the size of the lumen of the bowel proximal and distal to the lesion, accompanying subacute or chronic obstruction; (2) pericolonic abscess or infection; (3) an excessively fat mesentery obscuring the vascular pattern, and (4) a poor systemic condition of the patient, particularly incident to old age. Breidenbach and Slattery (53) have employed obstructive resections in 2 instances of large, free perforations with spreading peritonitis. Incidentally, they prefer an intraperitoneal anastomosis to spur crushing and extraperitoneal anastomosis. At this terminal operation, a wider intestinal resection was effected because of the belief that an insufficient excision of the gland-bearing mesentery had been performed during the initial operation.

There is complete unanimity of opinion as to the necessity of the decompressive proximal vent for obstructive lesions of the colon. Cecostomy is valuable for lesions situated proximal to the sigmoid while a loop type of colostomy in the right portion of the transverse colon is employed for lesions of the sigmoid and for those still more caudally situated (53, 173). Of the cecostomies, the exteriorizing type appears to be superior to the tube type although the latter has adherents among excellent surgeons. It should be recalled that the cecum and the right segment of the transverse colon are the most accessible portions for decompression in a bowel that may assume an enormous size.

After a McBurney type of incision and (246) under infiltration anesthesia, Meyer packs off the cecum from the rest of the abdomen and uses a fine needle for suction to relieve gaseous distention. This procedure is facilitated by the use of a Hunt clamp which has a central opening that makes possible the insertion of a catheter for prompt decompression.

Parenthetically, obstruction of the colon in the presence of a competent ileocecal valve forms a closed loop type of obstruction that is comparable to the strangulated type of obstruction of the small bowel. It is important to realize that the patient with obstruction of the colon caused by cancer (other causes being volvulus, diverticulitis or other chronic inflammations, benign strictures, and intussusception) has two distinct conditions, namely, cancer and an obstruction. Each should be evaluated expeditiously. The performance of a decompressive vent is a life-saving operation and

one that should be performed with little manipulation and without exploration. This procedure will relieve the intraluminal pressure from distention, will restore the blood supply of the bowel to normal, will diminish the violence of the intestinal flora, will cause the disappearance of the edema of the bowel wall, and will promote the healing of ulceration and thus prepare the gut to withstand resection (55a).

The incidence of acute colonic obstruction in private patients is approximately 10 per cent, whereas the incidence of this lesion in ward patients is in the vicinity of 30 per cent (246). The mortality from this lesion is approximately 20 per cent.

Rectum. Cancer of the rectum and rectosigmoid is now being attacked more aggressively than ever before. The recent surgical attacks aim primarily at dissection of all possible lymph nodes along the inferior mesenteric vessels. Ault, Castro, and Smith (8) believe that upward lymphatic spread has been neglected. They extend the ligation of the inferior mesenteric vessels in the cephalad direction beyond the limits of present-day practice, thus eliminating abdominal lymph nodes that in the past were unremoved. Their clinical work followed that of Goligher's (138) anatomic studies already discussed. They also developed a three-way method of anatomic measurements which is carried out prior to, during, and after operation to indicate the precise location of the cancer.

Rosi (302) and State (331) treat cancer of the rectum (as well as that of the left colon) by abdominoperineal resection of the rectum and left hemicolectomy. In this operation the inferior mesenteric artery is ligated at the aorta. State removes one-fourth of the transverse, descending, and pelvic colons with their respective mesenteries as well as the lymph nodes along the anterior and lateral aspects of the aorta and inferior vena cava from the level of the third portion of the duodenum caudad. Dissection of the lymph nodes along the common iliac vessels is then performed. A transverse colostomy is constructed on the left side, which functionally is said to differ very little, if any, from a sigmoid colostomy. This surgical procedure is believed to be superior to the standard Miles operation as it removes the lymph nodes that drain the efferent extramural lymphatics of the rectum as well as the pathway of proximal metastatic spread of rectal cancer. Rosi performs the foregoing operation and, in addition, described and illustrated a technique of left hemicolectomy with ligation of the inferior mesenteric artery and anastomosis of the transverse colon to the rectal ampulla with preservation of sphincter control. These operations are also practiced by Meyer (246) and advocated by Grinnell (153).

Of historic interest is the fact that Moynihan, in 1908, advised high ligation of the inferior mesenteric artery (above or just below the left colic artery) in the performance of abdominoperineal resections and in resections with anastomosis for cancer of the rectum and sigmoid. A point frequently overlooked or forgotten is that Miles, in his original paper (1908), had advocated high ligation of the inferior mesenteric artery and placed the desirable point of ligation at or just below the origin of the first sigmoidal artery for the removal of all possible lymph nodes as lymphatics in general closely follow the arterial pattern. Many lymph nodes are encountered in the space lying between the sacral promontory and the origin of the inferior mesenteric artery, which space is roughly 10 cm. (2½ inches) long. In a recent paper Grinnell and Hiatt (154a) encountered metastatic lymph nodes in 19 of 41 surgical specimens; 12 of these lymph nodes were found close to the neoplasm while 7 lay so high that they would not have been removed if ligation of the inferior mesenteric artery had not been done at its origin from the aorta.

Deddish (89) ligates the inferior mesenteric artery at the aorta or below the left colic artery and removes the para-aortic lymph nodes distalward to include the lymph nodes in the promontory, iliac, hypogastric, and obturator areas. In women, bilateral salpingo-oophorectomy, total hysterectomy, and excision of the posterior half of the vagina are performed. He believes that this extensive dissection is justified by the occurrence of residual cancer in the foregoing regions. Because of the frequency of lymphatic spread in anterior, infiltrating, or annular cancers of men occurring at the level of the seminal vesicles or prostate, both vasa deferentia are cut above the seminal vesicles and the latter with the posterior half of the prostate are removed with the rectum. The standard Miles technique plus the wider removal of adjacent tissues, such as the lateral stalks and the levator ani muscles, is still an excellent operation for cancer without nodal involvement. However, when metastasis to the lymph nodes has occurred, as detected by the surgeon or the pathologist, at the time of operation the more extensive procedures should be employed. There are, however, cases in which metastases cannot be detected until the smaller glands have been cleared of the fat and examined histologically in the standard manner. Whether these instances jus-

tify the routine performance of the more extensive surgical procedures, only time and further study will tell. Our own limited observations force us to conclude that the hope of cure lies primarily in early diagnosis, and secondarily in radical surgery. Operations that separate the patient from the tumor no doubt have a place in cancer therapy but the price of morbidity (90), if not of mortality, is high and certainly is prohibitive in many cases. At the moment many surgeons see the trees but not the forest; nodal metastases are stressed whereas the biology of the neoplasm and fine biologic control are neglected. The last factor is responsible for long life in the presence of microscopic cancer. (See Welch's remarks regarding radical surgery for cancer of the left colon).

Recently there has been a tendency to effect primary closure of the posterior or perineal wound largely to add comfort and to hasten the discharge of the patients from the hospital. Such technique is well described by Crile and Robnett (85). (Also see *Proc. Mayo Clin.*, 1952, 27:241).

The occasional complication following the Miles operation is obstruction of the small bowel (141, 366). Herniation of the bowel may occur through an opening of the newly constructed pelvic floor, or in the vicinity of the colostomy through the lateral space. Of course, late adhesions unrelated to the operation per se are another important cause. Mechanical obstruction may be confused with paralytic ileus. Exploratory operation is indicated when intestinal intubation with suction fails to give immediate relief. At operation adhesions may be divided and hernia reduced.

The survival rate of patients without nodal involvement, in the hands of some surgeons, is about 75 per cent after the Miles operation for from 5 to 10 years as against a survival rate of about 45 per cent for 5 years for patients with nodal metastases (132a). However, we are aware of reports of 5 year survival rates of less than 10 per cent (46). Many unreported factors enter into these calculations, including advanced or hopeless cases as presented by some rural, and unprivileged large city patients. In general, reported results of treatment of carcinoma of the large bowel and rectum are characterized by extreme disparity. Welch and Giddings (386) believe that the two best methods of calculating survival rates are by (1) including all cases appearing in a given clinic or geographical area, and (2) calculating the survival rates according to the number of patients on whom resections are done.

Wangensteen's "second-look" idea claims to give the best curative results in cancer of the colon (373). In infraperitoneally located carcinoma of the rectum with metastatic lymph nodes, a "second-look" of the perineum and of the peritoneal cavity is claimed by him to be particularly worthwhile. At the time of the first re-entry or first "second look", an attempt is made to remove all detachable residual cancer in the metastatic lymph nodes. Of 17 patients in whom the removed regional lymph glands were the seat of macroscopic or microscopic evidence of malignancy, 11 were free from carcinoma at the time that Wangensteen wrote his second report (375). Since the cure rate of cancer with nodal involvement is notoriously small, this procedure will be worthwhile if a substantial number of patients with residual cancer at the first "second look" will be free from cancer on the second inspection or subsequent re-entries. Wangensteen *et al.* presented an interesting detailed history of a woman aged 60 who had had a carcinoma of the right colon with gross metastases to the regional lymph glands. During a period of a little over 2 years, five re-entries into the abdomen had been made, and, on each occasion save the last, residual cancer was found and extirpated; this patient is now believed to be cured.

Anterior resection. When a cancer of the lower sigmoid or rectosigmoid is removed by so-called anterior resection, inferior mesenteric vessels should be divided as high as local conditions permit. Distal to the neoplasm, as much as possible of the bowel and retroperitoneal tissue should be removed, preferably 5 cm. or more if possible. The safe margin of excision of bowel distal to the tumor has not yet been conclusively determined.

Goligher (138), on the basis of his anatomic studies, has described three methods of ligation of the branches of inferior mesenteric vessels to be utilized in anterior resections that will eliminate most of the bowel and the lymph nodes proximal to the growth and yet will preserve sufficient sigmoid for re-establishing intestinal continuity.

Method I. In the average case with a reasonable length of sigmoid colon, the most dependent point on the loop is supplied by the first sigmoid artery, so that by tying the inferior mesenteric vessels just below the origin of this branch and dividing the mesocolon parallel to it, a sigmoid stump is obtained, with a direct blood supply to its tip which can extend practically to the peritoneal reflection and will therefore usually suffice for anastomosis after resection down to this level. For some cases with resection at an even lower level this method will also be adequate because when the rectum is mobilized so that it assumes a straight course upward from the anus instead of lying in the concavity of the sacrum, the level of

the peritoneal reflection may rise as much as 2 inches. If a longer sigmoid stump is required, it may be secured by either of the succeeding two methods.

Method II. In this method the inferior mesenteric artery and mesocolon are divided as in method I, but instead of section of the bowel, it and the intersigmoid arcades for some distance below this are preserved intact. The length obtained by this maneuver depends on the width of the gaps between the sigmoid arteries, which is actually very variable, but generally 2 to 3 inches of lengthening can be accomplished in this way.

Method III. Here, after ligation of the inferior mesenteric vessels just below the common origin of the first sigmoid and left colic arteries, the first sigmoid artery itself is divided close to its commencement, or in the cases where it and the left colic arteries arise independently the main inferior mesenteric ligature is applied between these two branches. Thus reliance is placed entirely on the descending branch of the left colic artery and the marginal artery between it and the first sigmoid artery for the supply of the stump. This opening up of the large "window" between the first sigmoid and the left colic arteries usually secures an additional 2 to 3 inches of colon, and further permits of another inch or two being obtained, if necessary, by division of the peritoneum at the outer side of the descending colon and mobilization as far as the splenic flexure. Until the first sigmoid has been divided, freeing of the descending colon in this fashion is futile because the factor determining the extent to which the end of the stump can be brought down is the intact first sigmoid.

Experimentation with the arterial specimens showed that however short the sigmoid loop might be, enough colon could always be provided by one of these maneuvers, most often method III, to permit of end-to-end union with the anorectal remnant after resection 1 inch or so below the anterior peritoneal reflection.

When the entire sigmoid colon has to be sacrificed, as for example in certain cases of double carcinomas, it is possible to resect up to the splenic flexure or middle of the transverse colon and anastomose the remainder of the transverse colon to the rectal stump as in the technique of Rosi. The technique consists of resecting up to the splenic flexure and then sewing down the left end of the transverse colon nourished by the long left branch of the middle colic artery. A third possibility is to utilize a loop of ileum, isolated except for its blood supply, as a graft to bridge the gap between the stump of iliac colon and the rectum.

A technique of transplantation of the ileum to the colon with a view to restoration of the continuity of the bowel has been described by Mueller and Fischer (255b).

The controversy concerning the merits and deficiencies of operations that aim to conserve sphincter control, particularly of the so-called "anterior resection" is continuing (37, 64, 70, 102, 123, 231, 235, 286, 291, 306). The desire to preserve the anal sphincter function greatly influences the advisability of anastomotic procedures. Sentiment about this matter led Mahorney (225a) to state: "I do have some sentiment about the sphincter; in spite of a higher mortality rate, re-establishment of continuity may be justified when surgical judgment is tempered with philosophy. It is difficult to measure numerically, but I have an idea that 40 patients living with restored continuity are worth 50 living with colostomies." Parenthetically, the history of colostomy has been recorded (*Surgery*, 1952, 31:794).

Wangensteen, who was one of the pioneers of anterior resection, on the basis of continued follow-up observations of his early patients subjected to this operation, believes that: (1) this surgical procedure is unsuitable for cancer situated at 8 centimeters or less from the anal orifice because of the high incidence of local recurrence at the site and outside of the anastomosis; (2) because of an absence of recurrence, this anastomotic procedure is indicated for the extirpation of lesions located from 14 to 20 cm. from the anus, and (3) the site between 9 and 13 cm. from the anus constitutes the controversial level. Although he had noted a local recurrence of 6.3 per cent in this intermediate group of lesions he nevertheless believes that with proper case selection, anterior resection may be carried out in patients with cancer situated at this controversial level.

Primarily because of the incidence of recurrences, Garlock and Ginzburg (123) have abandoned the procedure of anterior resection for the extirpation of cancer of the rectum proper, but employ it, local conditions permitting, for carcinoma of the rectosigmoid which, as already stated, according to their studies lies between 15 and 20 cm. (6 to 8 inches) from the anal verge. They rightfully feel that any sphincter-saving operation should offer the patient the same chance for cure as does the Miles abdominoperineal resection of the rectum or it should not be used. However, the procedure is justified for cancer located at any level if it is used for palliation.

Dunphy and Broderick (102) are in agreement with Garlock and Ginzburg. They believe that anterior resection should be employed only (1) to

extend the scope of resection in carcinoma of the lower portion of the sigmoid, (2) to avoid colostomy when the existence of distant metastases, such as hepatic, from cancer of the upper rectum or rectosigmoid is established but when the local lesion can be removed (importantly, they stressed that unless the local neoplasm can be extirpated widely, an abdominoperineal resection provides much more effective palliation), and (3) to avoid colostomy in elective surgery of cancer of the lower pelvic colon and lower rectum when a margin of normal bowel of 10 cm. (4 inches) can be resected distal to the neoplasm, when the pelvic fascia is not invaded by cancer, and when the lymph glands are not obviously involved. This automatically excludes lesions lying below the peritoneal reflection. Best results are obtained when the cancer is situated more than 15 cm. from the anal verge, when it does not invade the fascia propria, and when it lies above the peritoneal reflection. Lymph node involvement increases the likelihood of retrograde metastases.

To these indications should be added the one in which a colostomy is an intolerable burden as in the case of impending or actual blindness.

For the sake of emphasis, we reiterate that Dunphy's insistence of 10 cm. for the operative margin of normal bowel as the barest minimum is predicated on his personal observations that this will result in a 5 or 6 cm. margin in the freshly removed specimen and this in turn will shrink to the desired 2 cm. margin after fixation in formalin solution. This is the minimum requirement set by Black and Waugh (41a) and is based on their microscopic studies which showed that the extent of the growth beyond the gross base of the cancer was always less than 2 cm. in the formalin-fixed specimen.

In actual practice the 10 cm. margin in normal bowel is about equal to the width of the surgeon's hand, and this constitutes a rough but quite an accurate measurement.

The additional reasons for the wisdom of removing a substantial segment of normal bowel adjacent to the primary growths are: (1) the known vulnerability of the terminal portion of the colon to neoplastic degeneration, and (2) the theoretic proposition that the mucous membrane of normal intestine just distal to a proliferative growth may be layered with actively growing cells shed by the cancer. In fact, Morgan and Lloyd-Davies (252) believe that these neoplastic cells are incorporated in the granulation tissue of the line of anastomosis and the factor of trauma incident to suturing may produce local implantation and recurrence. In this connection it should be pointed out that local recurrence is encountered not only at the suture line but also outside of it, and that the growth extends secondarily into the bowel which suggests the failure of removal of the invisible laterally spread cancer. Local recurrences constitute an indictment of any surgical procedure. These considerations question the soundness of saving the portion of the bowel below the site of anastomosis—the fertile soil for cancer.

While on the subject of recurrence let it be noted that Garlock and Ginzburg have shown clearly that the incidence of local recurrence varies directly with the level of the cancer. They noted the rate of recurrence in 13 private patients with lesions lying at a level between 8 to 10 cm. (3 to 4 inches) from the anus to be 30 per cent at the suture line and none in the pelvis, while 7 ward patients presented a recurrence rate of 20 per cent in the suture line and 40 per cent in the pelvis, giving a combined percentage of 60. In 14 private patients with the lesion situated at a 10 to 13 cm. (4 to 5 inches) level, the recurrence rate at the line of anastomosis was 35.7 per cent and in the pelvis 7 per cent; 5 ward cases showed a 40 per cent recurrence at the suture line with no recurrence in the pelvis. In 29 private patients with the lesion at 13 to 15 cm. (5 to 6 inches) the rate recurrence at the suture line and in the pelvis was equal at 10.3 per cent, while no recurrence was noted in their 2 ward patients with lesions at that level. Significantly, in 60 private patients with lesions situated between 15 and 20 cm. (6 to 8 inches) the rate of recurrence at the line of suture was 3.3 per cent and in the pelvis 1.6 per cent, which gave a combined percentage of 4.9 per cent, while in 15 ward patients the recurrence at the suture line was 8.3 per cent with none in the pelvis. The findings in this series of cases are significant as these patients had been followed up and examined by the authors themselves; reliance was not placed on examinations by other sources or correspondence with the patients.

Dunphy wisely stated that the final decision to perform an anterior resection should be made after the rectum is mobilized. This operation is justified when a hand's width of normal bowel extends caudad or distal to the growth, and the lesion is not low enough to invade the pelvic fascia.

A properly performed anterior resection includes mobilization of the pelvic colon and rectum to the coccyx posteriorly and to the prostate or vagina anteriorly. The same extent of mesentery and lymph nodes is extirpated as in the abdominal part of a Miles type of resection. The point of division of the inferior mesenteric vessels should

be as high as in the Miles procedure (215). The blood supply, as already discussed, is variable and cannot be determined arbitrarily by division of the bowel at any set point. The first consideration is not the blood supply but adequate eradication of the cancer. Once this has been accomplished, the viability of the remaining colon and rectum is assessed. As already discussed, pulsation of the vessels and color of the bowel are the important guides for proximal vascularity. Distally as well as proximally, the vascularity is demonstrated by adequate bleeding from the cut edge of the rectal stump. This constitutes a valid reason for the employment of an open anastomosis without the use of a crushing clamp.

Garlock and Ginzburg have illustrated well their technique of anterior resection.

A simplified method of rectocolic anastomosis with the aid of a specially designed clamp was recommended for cancer of the bowel located above the cul-de-sac level by Sugarbaker and Wiley (336) on the basis of alleged simplicity, technical facility, security, and adequacy of extirpation of the primary growth. This clamp is said to establish and maintain the anastomosis of the cut ends of the bowel following the radical resection of the cancer-bearing colon. On paper this technical maneuver looks appealing, although we are always critical of special appliances.

Richards and Thomas believe that anastomosis of the bowel, particularly in difficult sites such as the pelvis near the peritoneal reflection, can be facilitated by the use of a supporting ring timed to disintegrate within 40 hours. The rings are 25 mm. long, 14 to 31 mm. in outside diameter, and slightly thickened at both ends (*West. J. Surg.*, 1948, 56: 592).

The technique of combined abdominoendorectal resection for certain types of cancer of the midrectum and the upper part of the rectum was described and well illustrated by Black (48). By April, 1952, Black had performed more than 40 of these operations in properly selected patients and he was satisfied with the results. (Also read *Arch. Surg.*, 1952, 65:406).

The abdominoanal pull-through operations described by Swenson and Hiatt for the treatment of Hirschsprung's disease are being applied for the treatment of cancer of the terminal colon (386b, 154a). Their combined reported series of only 19 cases are too small for evaluation. Grinnell and Hiatt stated that sphincter control following this procedure is inferior to that following anterior resection.

The technique of low end-to-side rectosigmoidal anastomosis has been described and well illustrated by Baker (23). This operation has been successfully utilized in 90 of the author's 211 resections of the pelvic colon and rectum. The advantages of this procedure are enumerated. The operative field has seemed more orderly to Baker than that in the end-to-end anastomosis. His last point is certainly open to question and argument.

Pull-through technique. This so-called Hochenegg procedure was popularized in this country by Babcock and has recently been given new impetus by Bacon. In one (17) of his numerous recent articles on this subject, Bacon reported 486 proctosigmoidectomies without abdominal colostomy in which the entire rectum, lateral stalks, levator muscles, mesorectum, and mesosigmoid were removed with high division of the inferior mesenteric vessels and preservation of the sphincter muscles. This operation is employed for cancers situated above the last 6 cm. (2.5 inches) of the rectum with a mortality rate of only 4.9 per cent but with a local recurrence of 17.9 per cent. The interested reader is referred to the original articles of Bacon, Babcock, and Mandl.

Most surgeons of wide experience are vigorously opposed to the pull-through technique. Ravdin (286) does not believe that this operation affords wide dissection of the pelvic floor and perirectal tissues. Ravitch (291), too, does not consider this a sufficiently radical operation; in addition normal sphincter control is not often obtained. This gives a measure of reality to Gray's humorous remark that these patients truly lose their "Social Security" (*Clin. Cong. Am. Coll. Surgeons, New York, Sept. 22, 1952*).

Sphincteric continence, the alleged principal object of the pull-through operation, is lost by the extirpation of the rectum even if the sphincteric musculature is left intact. As already discussed, Gaston (128) and Goligher (140) have demonstrated that the afferent fibers of the reflex arc which control this act of defecation are in the rectum. Mayo (244), a surgeon of wide experience with cancer of the colon, has stated, "I think the so-called pull-through operation, well performed, does have a place. From my experience with it, I am equally of the opinion that it is not an operation for me to perform." It certainly is not an operation to be performed even by the best trained surgeon who does not have access to an abundance of clinical material, as Bacon himself has termed it a "tricky" operation (12).

Also the perineum is regarded by the very ablest surgeons as an unsatisfactory site for colostomy.

Electrocoagulation of resectable cancer of the rectum is unjustified. In our hands, this procedure lacks palliative value even in the early

phases of cancer in patients who are considered poor risks for any surgical procedures such as the Lockhart-Mummery. Incidentally, this surgical procedure has lost favor with many surgeons in the last decade; the general feeling is that a patient who can withstand this compromised surgical procedure can most likely withstand the orthodox Miles procedure.

Involvement of adjacent organs. There is a universal agreement, as already alluded to, that cancer of the bowel involving adjacent organs calls for aggressive resections of the primary tumor with the whole or parts of the involved organs, particularly the area of contact. Sugarbaker and Wiley (335), on the basis of fixation, have divided these tumors into three groups: (1) those that invade the surrounding structures grossly or are solidly fixed to them—these require extended operations; (2) those with restricted movement but which are neither solidly fixed nor freely movable—extended resections minus the removal of the base of the urinary bladder are advised for the good-risk patient, otherwise a wider than usual removal is indicated; and (3) those which are freely movable—these do not require extended resections (see Pathology of Cancer in text).

The question often is raised whether a resectable lesion with distant metastases (liver, lungs, bones) justifies the resection of the primary neoplasm. Most, if not all, surgeons agree with Ravdin (286) that the patient "will live his final period of life in greater comfort" after operation "than he will if the lesion is left behind to involve the bladder and the regional nerve supply."

In a progress report based on the first 100 procedures of partial and complete pelvic exenteration, Brunschwig and Pierce (58) state that this ultraradical operation is worth while and that it is offered to patients who already present, for the most part, failure of less radical surgical therapy or who have advanced cancer that cannot be expected to respond to standard operative techniques. Bricker and Modlin (55), advocates of pelvic evisceration for advanced pelvic cancer or rectal cancer with genitourinary involvement, have, however, stressed the fact that this ultraradical type of surgery is still in an investigational phase. They also pertinently stated that it is important to evaluate most critically those patients who were not benefited as well as those who were benefited by this procedure in order to obtain an accurate and fair picture of the over-all results.

The construction of substitute bladders is discussed by Gilchrist (133) and Bricker (54). The technique of ureterointestinal anastomosis by direct elliptic connection is well described and discussed by Nesbit and Bohne (261). (Also see *J. Am. M. Ass.*, 1952, 150:177).

Anus. Epidermoid anal carcinomas arise from the epithelium of the anal canal. They occur either as a basal cell or squamous cell lesion, or a squamobasal cell lesion (177). The former metastasizes slowly and late, while the latter may metastasize very early and rapidly.

The early lesion, if localized to the perianus or anus, may be treated by wide local excision (291) just as similar tumors elsewhere in the skin are treated. If invasion into the anal canal (or rectum) is present, an abdominoperineal resection of the rectum and anus with dissection of the inguinal glands is indicated either at the time of the original operation or at a later date. Mendelsohn and Mansfield (244) have presented a simplified technique of radical groin dissection.

Irradiation is considered inferior to surgical excision either as a method of cure or as a palliative procedure for the relief of local symptoms (337a) although it is practiced by radiotherapists for early superficially invasive papillary lesions. Parenthetically, the anus does not tolerate this form of therapy well (267). Pack (267) employs irradiation in old debilitated persons particularly when they have small, movable lesions usually involving the mucosa. He also employs roentgen ray therapy for fixed inoperable cancers with a view to rendering these resectable by eliminating the associated infection.

Melanomas. The treatment of this anorectal melanoma (see elsewhere in the text for a full discussion) which usually arises at the mucocutaneous junction demands radical surgery consisting of an abdominoperineal resection of the rectum, the removal of the pelvic, retrorectal, and inguinal glands in continuity or at a later date. Irradiation is completely useless.

Therapeutic implications of lymphosarcoma, sarcoma, and hemangiomas are discussed briefly in the chapter on pathology.

Cancer in pregnancy. Jennings (188) described the seventy-eighth case of cancer of the rectum complicating pregnancy. He recommended: (1) resection (abdominoperineal or end-to-end anastomosis) of the rectal neoplasm during the first and second trimesters; (2) a cesarean section and, depending on the patient's condition, resection of the cancer at this time or after a lapse of about a month during the seventh or eighth month of pregnancy; and (3) in the ninth month, induction of labor with delivery through the normal route followed by resection of the rectal tumor in about a month or the procedure advised under caption number two. The genital organs are removed

when these are directly involved by direct extension of the cancer.

Colostomy. McLanahan and Gilmore (239) evaluated the colostomies in 40 patients on the basis of their opinions and performance. In 27 patients (68 per cent) the colostomy control was satisfactory; in 3 (7.5 per cent) there was no control and to them the colostomy was unacceptable. A return to normal preoperative activities was experienced by 17 patients (42.5 per cent); 21 (52.5 per cent) had curtailed their former activities, while complete invalidism was observed in 2 patients (5 per cent).

Eleven patients had either hernia or definite weakness of the abdominal wall about the colostomy stoma, 3 had prolapse, 2 each had a fistula and stenosis, and 1 experienced bleeding from the stomal mucous membrane.

The use of a bag is discouraged. Most patients require irrigation (every other day) but many reestablish regular habits by means of diet and willpower (221).

The management of the patient with a permanent colostomy by means of diet and irrigation is well discussed and illustrated by Turnbull and Michels (365). It should, however, be recalled that irrigations are not without danger, such as perforation.

The complications of abdominal colostomy are well discussed by Birnbaum and Ferrier (39a). They discussed in some detail the following: (1) stricture, (2) hernia, (3) prolapse, (4) poor function, (5) small bowel obstruction, (6) obstruction of the colostomy stoma, (7) necrosis or recession of the colostomy loops, (8) hemorrhage, (9) infection of the urinary tract, (10) perforation, and (11) particularly the psychic reactions.

Campbell and Schaerrer (65) developed a new method of surgical reconstruction of the colostomy stoma, amputating it about a fortnight after the original operation and suturing the mucous membrane to the skin, thus eliminating any protrusions. Their technique is well described.

Goodman (142), and Weingarten and Payson (382) have succeeded in eliminating the offensive fecal odor emanating from the colostomy stomas by means of chlorophyll. The former inserts a capsule into the stoma, while the latter workers administer, orally, water-soluble chlorophyll tablets varying from four to eight daily.

The value of psychotherapy in colostomized patients has been stressed (114, 221).

CHRONIC ULCERATIVE COLITIS

This syndrome or disease is one of variables as the extent of involvement of the bowel, the clinical course, and the response to therapy are unpredictable and variable.

Pathogenesis. Warren and Sommers (378) described two distinct pathogenetic processes (1) local vasculitis (11 per cent), and (2) mucosal crypt abscess (39 per cent) that had led to ulceration in 50 per cent of their cases. The remaining half of their material was termed indeterminate as no clue to the pathogenesis was discernible. Vasculitis resembled periarteritis nodosum or thromboangiitis obliterans.

New concept. Levine (213) and his associates believe that connective tissue lesions in the colon indicate that ulcerative colitis is a collagen disease. Biopsy samples of the mucosal and submucosal material were secured at endoscopy and were examined with the aid of special techniques including phase microscopy. All of Levine's cases corresponded to Warren's crypt abscess group. In this type the basement membrane of the epithelial cells is altered; epithelium sloughs away and abscesses form. Homogeneous ground substance of the basement membrane is virtually absent and the reticulum is often fragmented. Where the mucous membrane separates the connective tissue, the intervening space contains water-soluble metachromatic material.

During successful therapy with corticotropin (ACTH), the lost ground substance returns in some areas. Furthermore, the basement membrane remains intact in amebiasis, venereal lymphogranuloma, and in other conditions involving inflammation and necrosis of the intestine. Apparently, the basement membrane is a dynamic element that does more than to maintain continuity of the mucosa and the submucosal connective tissue.

The validity of this work may be questioned since Klemperer has shown that collagen diseases are characterized by generalized, and not local, alterations of extracellular components of connective tissue. Chronic ulcerative colitis has not been considered a systemic disease (200a).

Reversibility. Kirsner (198) and his associates presented clinical and roentgenologic evidence of reversibility in ulcerative colitis. In 2 cases they noted reversal of the contracted and rigid colon to normal, the passage of well-formed stools despite extensive scarring, and the disappearance of strictures in the rectum. Treatment in most cases was prolonged, and in the more recent cases ACTH (corticotrophin) was included in the therapeutic regimen.

Regional colitis as an acute abdominal emergency was well discussed by Brownlee (57). The site of the lesion in the author's 3 cases was the

distal end of the transverse colon. In no instance was a correct preoperative diagnosis made. So protean are the pathologic changes in regional colitis that the presenting signs and symptoms are correspondingly most diverse. As in the case of regional ileitis, Brownlee distinguished four types of lesions: (1) the early and acute phase in which a small segment of reddened and thickened bowel is discernible and the peritoneal reaction is present, which gives rise to symptoms; (2) the stage of mucosal ulceration giving rise to diarrhea with mucus and blood; (3) narrowing of the colonic lumen due to fibrosis and leading to intestinal obstruction; and (4) a type in which abscesses and fistulas form. Segmental ulcerative colitis must be differentiated from the dysenteries, syphilis, actinomycosis, tuberculosis, diverticulitis, and, most importantly, from carcinoma.

The treatment for the acute case is transverse colostomy with complete transection of the bowel or, in case of doubt, an ileostomy or cecostomy. Further treatment depends upon whether or not the bowel is damaged permanently. Should the colon return to its normal state, simple closure of the colostomy is indicated. Irreversible colonic changes make resection mandatory.

Ileal involvement. The incidence of occurrence of ileal involvement is close to 30 per cent (236). The length of the involvement varied from 4 to 5 centimeters. The nature of the ileal disease was similar to that of the colonic lesion.

Metabolic changes have been discussed recently (275, 277).

Pregnancy. A study of 46 pregnancies in 33 patients with ulcerative colitis by Abramson and his associates (1) showed (1) that ulcerative colitis was reactivated in 7 patients with quiescent lesions; (2) that it was aggravated in 17 persons with active ulcerative colitis and resulted in the eventual death of 2 patients, and (3) that ulcerative colitis was fatal for 4 of 5 patients after acute onset during pregnancy and for 3 patients after acute onset during the puerperium. It appears that chronic ulcerative colitis contraindicates pregnancy except possibly after a long remission (351).

A case of fulminating ulcerative colitis in a newborn infant was recently reported (368). Ulcerative colitis in juvenile patients is not a rare occurrence (356).

Psychiatric factors. Most of the patients are the products of an uncertain childhood. They have experienced conflict with an aggressive or abusive father and a possessive, oversolicitous mother which has led to dependence upon the possessive mother and the development of a false front. Mahoney and his associates (225) found many neurotic traits in persons with ulcerative colitis, but their personality studies failed to show the reason for localization of the pathophysiologic process in the large intestine. White (389) stated that nearly 50 per cent of the patients with ulcerative colitis are emotionally immature and unable to throw off the yoke of attachment to a parent or a person serving as a parent-image. The patient may harbor feelings of hostility or resentment toward the person to whom he or she is attached. Death of a dominant parent, marriage, or birth of a child often exacerbates the illness because the quasisecurity built on immature emotional ties is threatened. White has observed that although the basic immature personality of the severely malnourished patient with ulcerative colitis is unchanged by colectomy, surgical intervention, however, brings about the disappearance of the superadded depression, negativism, and petulance that often accompany the colonic disease process. White believes that every psychosomatic illness may be visualized as a vicious circle with environmental occurrences acting upon the personality to produce tension, the tension reacting upon the susceptible organ to cause or aggravate the disease, and the symptoms evoked intensifying the environmental difficulties. Surgical relief, followed by disappearance of depression and of the gross outward manifestations of immaturity appears to break the circle.

Lysozyme. This subject has been studied recently by many workers. The present status is well summed up in a recent editorial (107). Lysozyme is not believed to be a causative agent in ulcerative colitis, but rather serves as an index of the degree of activity of the ulcerative process.

Cancer and ulcerative colitis. This subject has been discussed under the Pathology of Cancer and Adenomas.

Treatment. Corticotropin (ACTH). Gray and his associates (147) have observed dramatic reactions in the acute phase of ulcerative colitis induced by corticotropin (ACTH). The remission is characterized by a significant decrease in the diarrhea and blood in the stools, improvement in the appearance of the mucous membrane as observed endoscopically, relief of tenesmus and abdominal pain, fall in the temperature, sedimentation rate, and fecal lysozyme titer, and an increase in weight and appetite accompanied by a sense of well being. The colonic mucosa does not, however, revert to normal nor does ACTH influence colitis of long duration that is accompanied by extensive fibrosis, cicatrization, strictures, and anorectal fistulas. The remission brought about by

ACTH, while not lasting, may, nevertheless, be helpful in tiding these patients over a critical time and thus aid in their preparation for surgical intervention. This mode of endocrine therapy is not a cure but constitutes a valuable adjunct in the therapy of the early stages of ulcerative colitis. It induces remissions without changing the basic underlying problems.

Kirsner and Palmer (197) also studied the effects of corticotropin on ulcerative colitis in 40 patients under controlled conditions. The clinical response during the administration of ACTH was considered good in 27, moderate in 7, slight in 2, and valueless in 4 patients. Large quantities administered for from 6 to 8 weeks were more effective than short periods of therapy. The degree of improvement paralleled that obtained with other forms of therapy, but ACTH produced prompt and occasional dramatic remission unparalleled by other methods of treatment. Corticotropin does not cure ulcerative colitis nor does it eliminate the factors responsible for recurrence; the basic personality structure of the patient remains unchanged. The possibility of perforation of the ulcerated gut or at other sites of ulceration (peptic) should be kept in mind. (Also see 349a).

The effect of cortisone in ulcerative colitis was studied by Redish (294), who noted no evidence of beneficial effects on the ulcerative lesions of the colon. Kirsner (197) also obtained disappointing results with cortisone, but others (*J. Am. M. Ass.*, 1952, 150: 1587) disagree, pointing to the need of prolonged administration of large doses of cortisone.

The effect of banthine was investigated by Plummer and his associates (274) who observed this substance to be of value in the control of abdominal pain but without any influence upon the diarrhea or the disease process as seen endoscopically.

Thiouracil and propylthiouracil have been proposed again recently, having first been suggested in 1946 (229a). These drugs are believed to exert their effects on the parasympathetic innervation of the colon, thus influencing a beneficial effect after prolonged use in patients with reversible clinical and anatomic manifestations of chronic ulcerative colitis (162).

Surgical. The indications for surgical therapy are particularly well discussed by Lahey (203).

Section of parasympathetic nerves. As already stated elsewhere in the text this operative approach is in the process of evaluation by Hinton (318) and Scott (319).

Vagotomy. Consult Grace's studies (144) elsewhere in the text. Eddy (104), however, believes that vagotomy in most cases breaks a previous cycle of remission and exacerbation or ends a continuously chronic process, and the patient's status of health is thus restored with coincident economic usefulness. Patients with ulcerative colitis of 5 years' duration or longer responded less well than patients with commensurately severe disease of shorter duration. Vagotomy is believed to reduce intestinal mobility and spasm, and to interrupt a cycle of nervous and emotional imbalance that influence the large bowel. Patients who do not respond to vagotomy should have ileostomy and colectomy (91).

Ileostomy. The technique, complications, and management are discussed exceedingly well by Warren and McKittrick (377). These workers prefer an end ileostomy with a closed distal ileal stump returned to the peritoneal cavity. The ileal stoma is not anchored to the peritoneum or to the layers of the abdominal wall. The postoperative complications are described lucidly, and considerable space and thought are accorded to "ileostomy dysfunction." The interested reader is referred to the original article which the reviewers have read many times. Several different types of ileostomy bag have been described recently (31, 92, 137, 174). (Also see *Surg., Gyn. Obst.*, 1952, 95: 29).

Ruthberg (personal communication) stated that his experience with his last 5 cases of pregnancy in ileostomy patients has shown no complications. Usually at the fifth month the ileostomy begins to increase in size to a maximum of one and one-half times the normal. This requires an increase in the size of the opening of the appliance. No difficulty was experienced in labor. The ileostomy returned to normal in about 6 weeks postpartum.

A special club composed of patients with ileostomy has been described (221a). The benefits derived are both psychological and medical; the patients are aided to become rehabilitated and the medical and nursing staffs are educated in the management of ileostomized patients.

Colectomy. It is generally agreed that ileostomized patients require subtotal or total colectomy as ileostomy may cure the patient but appears to have little curative effect on the colonic disease process (351). Following the impetus given by Miller and his associates (247), primary, permanent ileostomy and subtotal colectomy to the level of the caudadmost portion of the sigmoid is now practiced by an increasing number of surgeons (21, 170). This procedure eliminates the source of the loss of blood (100 to 300 c.c. in 24 hours) and protein (100 to 200 gm. daily) as well

as the site of toxic absorption (300). The rectosigmoid and the rectum are removed at a later date; in some cases, especially under favorable conditions, one-stage permanent ileostomy and total colectomy are performed (170, 300).

Psychotherapy. Almy (2a) believes that the emotional problems are often well managed by internists and surgeons who actually never realize that they are conducting psychotherapy. Much can be accomplished if the clinician will think of the patient as a child and of himself as a parent. The unearthing and verbal going-over of deeply buried emotional conflicts are not required; such process is usually undesirable even when conducted by expert psychoanalysts.

GRANULOMAS

Kruse and Bleich (202) classified these lesions as follows: (1) specific—tuberculosis (hyperplastic and ulcerative), fungous disease (actinomycosis and blastomycosis), amebomas and syphilis, and (2) nonspecific—secondary to foreign bodies, to localized hypertrophic colitis or appendicitis, those produced by a simple penetrating solitary ulcer, and those produced by regional enteritis. Any one of these granulomas may mimic a cancer from which it must be differentiated usually with the aid of microscopy.

Tuberculosis. Ulcerative tuberculosis is usually secondary to a pulmonary focus or caused by the drinking of infected, unpasteurized milk. The earliest lesion is encountered in the lymphoid tissue, whereas extensive ulceration may be encountered in the autopsy material. Histologically, the lesion is destructive and laden with tubercle bacilli. The hyperplastic variety is rarely seen. It usually commences at the ileocecal junction and spreads into the small and large bowel. Masses of granulation tissue form in the submucosal and subserosal areas associated with thickening of the epithelium and palpable regional mesenteric lymph nodes to form a mass resembling a neoplasm. Histologically, an abundance of giant cells is present usually without caseation and tubercle bacilli. Hoon and his associates (169) classify ileocecal tuberculosis as ulcerative, ulcerohyperplastic, and hyperplastic. Animal inoculation, acid-fast tissue stains, and microscopy are utilized in the differential diagnosis of the various types of tuberculous lesions as well as in the differentiation of the specific lesion from nonspecific ileocecal granulomatous conditions.

Actinomycosis. Anorectal actinomycosis is a rare disease with a debatable portal of entry. The only certain diagnosis is by culture (143) and the finding of the characteristic sulfur granules in the pus, exudate, or within the involved tissue. The treatment now includes the sulfonamides, antibiotics, surgery, and, most important, the correction of deficiencies such as hyperproteinemia, anemia, and avitaminosis accompanying this disease.

DIVERTICULOSIS AND DIVERTICULITIS

The exact cause of diverticulosis and diverticulitis is unknown, but the lack of longitudinal muscle fibers (11), an inherent weakness of the muscular walls, and increased intracolonic pressure have been incriminated (258). Experimentally, colonic diverticulosis in aging rats has been produced by the lack of a suitable kind and amount of roughage (66). Bulk formers such as hemicellulose of psyllium seed husks prevented the formation of diverticula. Diverticula usually occur at points of least resistance where the blood vessels pierce, and are usually acquired. In some cases the diverticula are of congenital origin but they develop only in the presence of factors that make for the production of an acquired diverticulum (Beer). A diverticular wall consists of mucosa and peritoneum (serosa) and is devoid of muscles. Usually, the diverticulum projects beyond the serosal surface. Occasionally, however, an intramural dissecting type is encountered (77) in which the herniation burrows its way into the wall of the bowel and dissects between the intestinal layers, or a diverticulum may invert into the lumen of the gut, resembling a polyp (324).

Diverticula may occur in all segments of the colon including the cecum, but usually a portion of about 10 cm. of gut at the end of the descending colon and beginning of the sigmoid colon is involved by the diverticular process (111).

The presence of diverticula is thought of only after a pathologic process sets in. The onset and early cause of diverticulitis may resemble "left-sided" acute appendicitis. The various symptoms and signs produced by diverticulitis depend on the degree and extent of disease process as well as on the segment of the bowel that is involved. Backache, particularly pain in the lower part of the back, is encountered in many cases (175, 212), while bleeding from the rectum is both important and disconcerting. Rosser (304) believes that bleeding may be caused by diverticulitis, particularly the massive type which may be caused by erosion of a blood vessel. Intermittent but insignificant bleeding is rarely seen in diverticulitis; this type of bleeding suggests the presence of a concomitant neoplastic lesion such as a polyp or a cancer, and adds to the diagnostic confusion. Parenthetically, the diagnosis of diverticulitis de-

pends primarily on the roentgenographic demonstration of the diverticula, sometimes with the aid of etamon chloride (112); sigmoidoscopy alone with a scope 25 cm. long is of distinctly limited value as rarely can this instrument be advanced to the area of inflammation (111). An exploratory laparotomy is occasionally indicated (304).

Babington (11) suggested early surgical intervention in acute diverticulitis with a view to avoiding the dreaded complications, namely, perforation with abscess, acute perforation with peritonitis, peritonitis without perforation, perforation high in the rectum with resulting ischiorectal or ischional abscesses, pericolitis with peridiverticulitis and thickening of the intestinal wall eventuating in partial or complete obstruction, and enterocolic or vesicocolic fistula or cancer (Arnheim). There is considerable uncertainty as to what extent diverticulitis is incidental or etiologically directly contributory to the not so rare occurrence of cancer in diverticulitis (254). In view of the fact that the great preponderance of patients with acute but uncomplicated diverticulitis respond to conservative measures (18), such as rest, a low-residue diet (meat, cooked eggs, rice, sago, tapioca and fruit juices), and terramycin, they should be tided over without surgical intervention whenever possible. Furthermore, it should be kept in mind that manifestations of obstruction in acute diverticulitis may at times be due to an associated ileus of the small bowel (112). Recurrent (acute or subacute) and chronic forms of diverticulitis are best treated by resection of the involved segment of the gut (254); whenever the presence of cancer is suspected a radical resection is mandatory.

Colonic resection is best avoided in the presence of active inflammation (258). Obstruction should best be treated by the construction of a transverse colostomy on the right side followed by resection of the diverticular process with immediate open end-to-end anastomosis within a period of 2 to 6 months, followed by closure of the colostomy stoma. Fistulas to adjacent organs or to the exterior via the abdominal wall are best treated by the construction of a preliminary transverse colostomy to divert the fecal stream and to permit the inflammatory process to subside, followed by resection of the involved segment of the colon and closure of the opening in the adjacent viscus, such as the bladder, and in turn followed by closure of the colostomy (78, 230, 232).

For acute perforation, Swinton (311) employs simple closure of the perforation with a proximal diversional colostomy. An exteriorization procedure and simultaneous excision of the infected segment of bowel appears to be more ideal for this condition. For localized suppuration he employs incision and drainage followed by resection of the bowel with the diverticular process at a later date.

Numerous other approaches and techniques have been employed. Colostomy alone has been performed in the past, but experience shows that some time after closure of the stoma recurrence of acute diverticulitis invariably takes place; the modern view advocates resection of the segment of the colon that is the seat of the infected diverticular process.

VENEREAL DISEASE

Venereal lymphogranuloma. This is a systemic disease with localization in the inguinal region, genital tract, and the anorectocolonic tract (351). The intestinal lesions consist of proctitis, colitis, ulcerations, suppurations with anorectal fistulas, rectovaginal fistulas, and rectal stricture which may be tubular or diaphragmatic in type. Following the development of stricture, lymphorrhoids may form, which may be distinguished from true cancer only by histopathologic examination. The anorectal complications including stricture occur more often in women as a result of the spread of the virus through the direct but complicated lymphatic communication from the cervix, the posterior portion of the vagina, and the fornices to the lymph glands in the pelvis, and thence to the perirectal glands, producing perirectal infection and fibrosis. Men with primary scrotal and penile lesions and women with primary vulval lesions may develop buboes because of the superficial lymphatic drainage to the inguinal lymph glands. Bubo or inguinal adenitis is believed to act as a barrier to the spread of the virus to the pelvic and pararectal lymph glands. Proctitis and stricture may also be produced by direct implantation of the virus by sodomy or by contaminated enema tips or thermometers.

Of great importance is the coexistence of the lesion with cancer of the pelvis, vulva, and anorectum, which is unparalleled by any other venereal disease (281). (See discussion of the pathology of cancer elsewhere in the text).

These considerations again focus attention on the necessity of routine endoscopy and biopsy in most patients with this disease.

Wright and his associates (398) were the first to successfully employ the broad-spectrum antibiotics for the treatment of the prestricture stage of this disease. Proctitis, buboes, and acute manifestations are abolished. Secondary infections accompanying rectal stricture are obliterated.

Stricture. According to the present consensus, dilatation, digital or instrumental, may be dangerous and certainly never curative (315), nor do strictures ever disappear either spontaneously or as a result of drug therapy.

Colostomy is a simple but ineffective procedure. By this means the inflammatory process may be put to rest but is seldom arrested (109, 315), as evidenced by the occurrence of bleeding, purulent discharge, suppurations, and fistulas. Furthermore, we have observed 4 cases of epidermoid carcinoma in the strictured areas.

The more effective operation is the excision of the stricture-bearing area of the bowel by means of an abdominoperineal resection of the rectum (315) or a form of sphincter-saving operation (52, 109). Breidenbach and Slattery (52) first perform a temporary defunctioning type of transverse colostomy. In the presence of disease in the anal canal or perianal tissues, they perform a "pull-through" operation (see comments on this operative procedure elsewhere in the text), while in the presence of a normal anal canal and rectum (3 cm. of the terminal portion) they re-establish intestinal continuity by a combination of abdominosacral exposure. In this manner, they dispose of extensive involvement of the left colon, necessitating an anastomosis of the transverse colon to the rectum just above the anal canal. Eisenman and Meuller (109) have utilized an ingenious operation of transposition of the ileum. The strictured segment of the bowel is excised and the colon is mobilized to reach down to the intact anal sphincter for anastomosis. However, in cases in which mobilization is insufficient, a loop of ileum is swung on its mesentery to bridge the gap.

In our experience during the past 5 years, we have encountered only 3 women with high tubular types of stricture who were free from anorectal involvement and who might have been suitable for an anastomotic procedure. However, all of these patients had associated persistent pelvic inflammation which, in our opinion, is a contraindication to any anastomotic technique.

In summary, dilatations are useless and may be dangerous. Permanent colostomy, except for senile or poor-risk patients, is likewise an undesirable procedure. The tubular type of stricture is best treated by abdominoperineal resection. One of us (358) treats diaphragmatic types of stricture with or without anorectal involvement by high frequency or electrosurgical resection with a specially designed double loop resector quite similar to the transurethral resection of median bars at the vesical neck. The results to date have been satisfactory. We have closed temporary colostomies in 3 patients following electrothemic resection of the stricture. In 2 other patients the resected specimens revealed unexpected epidermoid carcinoma on routine histopathologic studies.

Granuloma inguinale. This distressing ulcerating lesion of the perianus, as elsewhere in the body, responds promptly to the broad-spectrum antibiotics (398).

Syphilis occurs rarely in the large bowel. A gumma usually forms in the submucosa and may break the mucosal barrier, causing ulceration of varying degrees closely resembling a neoplastic process (351).

VOLVULUS

In the United States volvulus, while important (63), is relatively uncommon; it is, however, commonly encountered in Europe and Asia. Volvulus of the sigmoid as a sole cause is responsible for approximately 20 per cent of all intestinal torsions and about 2 per cent of all intestinal obstructions (165). Volvulus may occur in any segment of the colon including the cecum (95); usually it occurs in elderly persons but has been reported in children (129).

Lead poisoning may cause intestinal volvulus, especially in a patient with a long sigmoid or other predisposing factor (33). Torsions apparently resulting from plumbism have been observed in 5 Peruvians who had sigmoids 3 feet long but with narrow and pediclelike mesosigmoids (4 involved the sigmoid colon and 1 the small bowel). The diagnosis was facilitated by the intravenous administration of calcium which relieves pain of pure plumbism but increases the symptoms of volvulus. Surgical intervention was successful in 4 cases, but failure to operate resulted in 1 death.

The predisposing factors include elongation or absence of the mesentery with a mobile gut (131), enlarged colon (129), constipation with a fecal hard bolus approximating fecal impaction (283), and megasigmoid (165, 131). The last has been ruled out as a cause of volvulus by the finding of normal ganglia of the myenteric plexus in the surgical and postmortem specimens; the sigmoid becomes dilated and hypertrophied as a result of chronic and recurrent obstruction incident to the volvulus (165). In the sigmoidal volvulus the redundancy of the sigmoid is the common denominator (165), while in cecal volvulus there is a failure of normal fixation of the cecum (95).

Gerwig proposed a logical classification: grade 1, implying an asymptomatic volvulus of less than 180 degrees; grade 2, designating a volvulus of more than 180 degrees with partial obstruction

that either untwists spontaneously or may be decompressed with the aid of a rectal rubber tube through an endoscope; grade 3, a volvulus of more than 180 degrees resulting in an irreversible, complete, but viable closed loop type of obstruction, and grade 4, a volvulus of more than 180 degrees with irreversible and unviable complete closed loop obstruction (131). An incidence of 66 per cent of infarction of the sigmoid and its mesentery was found in the presence of complete obstruction (165).

Roentgenologic signs are frequently inconclusive. A "bird's bill" or "ace of spades" type of deformity has been described. Recently, a new sign has been described (32) which shows a uniform diameter of both segments of the intestinal arch which has been produced by the distended sigmoid colon.

For sigmoidal volvulus, cecostomy is an ineffective and illogical procedure (63); in fact, proximal decompression of any type is contraindicated. Fixation procedures are unsatisfactory as are mesentery-shortening operations (129). Detorsion alone, either performed at laparotomy or, as already indicated, done endoscopically is ineffective because of the high incidence of recurrence of the volvulus, but it is acceptable as a temporary procedure to tide the patient over for a delayed intestinal resection or in the case of debilitated or otherwise poor-risk patients. Recurrences frequently necessitate subsequent resection "not of election but of desperation" (165) because of vascular irreversible damage (infarction). In the presence of gangrene an exteriorization type of operation is desirable (50, 276), but this procedure may not be possible if the point of torsion of the distal or efferent loop is too deep in the pelvis (50); in this case a Hartmann type of resection (inversion of the distal loop and construction of a proximal colostomy) may be necessary (131). Under favorable circumstances and in interval cases, resection of the volvulus below the twist and immediate end-to-end open anastomosis is the most desirable procedure (63, 165, 276).

For cecal volvulus simple detorsion and fixation are indicated in the absence of gangrene, while the presence of gangrene demands resection (95). For the correction of the intermittent type of volvulus a new operation has been proposed (95). The cecum is retracted medially on its long mesentery, a flap of the peritoneum that covers the lateral aspect of the mesentery and the lateral peritoneal fold is formed and elevated, the cecum is then returned to its normal anatomic position, and the elevated peritoneal flap is sutured over the cecum to the medial aspect of its mesentery.

INJURIES

Siler and Bebb (322) recognized direct and indirect types of violence that produce injury to the terminal portion of the colon and perineum. The traumatic agents of direct violence range "from pieces of wood and limbs of trees or bushes to various metal objects including pickets of iron fences, shrapnel, and bullets." They also recognized five anatomic sites of involvement: (1) the urogenital region, (2) the anal region, (3) the ischiorectal fossa, (4) the retroperitoneal infrapelvic space, and (5) the peritoneal cavity. Indirect violence is produced by sudden dilatation of the gut, usually by the introduction of compressed air (379).

Perforating injuries. Colonic. In military practice small antimesenteric colonic wounds are frequently accorded suture of the rent with the construction of a proximal vent, while the larger wounds are treated by exteriorization of the wound. The latter procedure became quite popular during World War II and has been applied too readily to colonic injuries in civilian practice. Woodhall and Ochsner (394) believe that exteriorization of wounds of the large bowel should be restricted to severe wounds of the easily mobilized segments of the colon. In civilian practice the colonic wounds are usually puncture wounds caused by a pistol or revolver, or laceration produced by a sharp knife. Such wounds in a viable gut without involvement of the mesenteric aspect can be effectively treated by primary suture with or without débridement of the wound edges. Woodhall and Ochsner employed primary suture alone in 22 cases with 2 deaths (9 per cent); in only 1 instance did an external fecal fistula occur. Necrosis, leakage at the suture line with resulting peritonitis, abscess formation, sepsis, or death were not observed in this group of patients. Primary suture with proximal decompression was employed in 10 patients with a mortality of 60 per cent. These workers advise this surgical approach for the treatment of wounds in the fixed segment of the colon "when primary suture is contraindicated and mobilization for exteriorization is impossible or might endanger the patient." Exteriorization was employed by them in 13 patients with 3 deaths (23 per cent). It is their belief that "at least 6 of the wounds so treated could have been closed primarily without danger." These writers advocated exteriorization for severe or major colonic wounds of the easily mobilized portion of the large bowel. Injuries of the fixed segments of the colon or serious wounds in other segments of the large bowel should be accorded radical surgery such as exteriorization, exteriorization and resection, or, as in the colon on the

right side, hemicolectomy with ileotransverse colostomy. Usually, however, resection with immediate anastomosis is best avoided. It should be added that the patient with serious colonic injuries usually has associated serious injuries to other viscera or solid organs that are lethal in many cases. Also, it should be an unfailing policy to observe the mesenteric border of every antemesenteric colonic injury as otherwise small mesenteric wounds may be easily overlooked with disastrous results to the patient; this procedure entails an incision of the lateral peritoneal leaves.

Extraperitoneal rectal injuries. Laufman's (204a) therapeutic recommendations established during World War II are sound and valid for civilian practice. He advised adequate drainage by either a parasacrococcygeal incision or a curved transverse incision below the tip of the coccyx, complete débridement, incision of the fascia propria (endopelvic fascia), suture of large wound (small wound need not be sutured), and colostomy. Coccygectomy is not done unless the coccyx has been damaged or if it interferes with the closure of the rectal wound. A sigmoid colostomy is sufficient in the absence of a large defect in the rectum; a large laceration calls for a colostomy far away from the rectum (right side of the transverse colon) to permit subsequent plastic repair of the rectal defect requiring mobilization of bowel or some form of a pull-through procedure.

Since closure of the rectal rent at the primary operation will invariably prevent the subsequent formation of chronic fistulas which are not easy to eradicate, we practice immediate closure of rectal wounds whenever possible and no matter how small the laceration may be.

Of great importance is the use of the endoscope in the evaluation of the existence of a rectal laceration; no harm can be produced by its use whereas the omission of this diagnostic procedure may result in a missed diagnosis.

Anal injuries. Extensive injury or complete division of the external anal sphincter muscle may occur (322). Injuries to the anal canal may involve the various fossae and spaces as well as the rectum proper. A formal proctoscopic examination including endoscopy is usually required.

Special injuries. Impalement. Fox (119) believes that patients with impalement should be hospitalized immediately following the injury for proper examination of the severity of the injury, particularly with a view to establishing at the earliest practical moment whether an intraperitoneal viscus has been penetrated. Signs of intraperitoneal perforation or peritonitis require an immediate exploratory celiotomy.

Perforation by coagulation. This injury is "not as uncommon as we would like to believe" (256). The tear usually occurs on the antemesenteric aspect of the colon above the peritoneal reflection and can be easily found and sutured at laparotomy which should be performed as soon as the patient has recovered from shock. Conservative therapy is advocated for patients in whom perforation is not recognized within 24 hours or for patients who are extremely poor operative risks.

Perforation by enema. The rent in the bowel occurs in about the same area as that produced by the proctoscope, but the accepted treatment is prompt surgical intervention (146, 380). It should be kept in mind that the colons of older people are particularly vulnerable to tears although a normal colon in a conscious person can be perforated without the use of much force. Berk (34) reported a case of perforation following a diagnostic barium enema. Perforation of colostomy loops may be caused by enema tips used for irrigation (151).

Perforation caused by coagulation. Myers and Bernstein (256) again called attention to perforations in the upper rectum and lower sigmoid produced by surgical diathermy employed for the eradication of polypoid growths. They are certain "that many minor perforations occur that are unrecognized" and they base this statement on evidence obtained "upon exploration of the abdomen for other reasons subsequent to the fulguration."

Foreign bodies introduced into the rectum via the anus include bottles (270), thermometers (227), and a variety of other agents (199). These do not require emergency care; they should be given a chance to pass spontaneously unless they are large, fragile, and breakable, or if a perforation has already occurred. Foreign bodies that are swallowed may become arrested at the pyloric ring, the ileocecal valve, at the colonic flexures, in the rectum just above or at the pectinate line, or, very often, in the anal crypts (317). If the foreign body becomes arrested in the intestinal tract it should be removed promptly by incision and closure; resection of the involved segment of the bowel is unnecessary (317). The foreign body lodging in anal crypts and causing pain and/or abscess formation should be removed promptly with the involved crypt.

HEMORRHOIDS

Etiology and pathology. Gass and Adams (125) described a fundamental early lesion as a loose and fragmented, collagenous connective tissue stroma in the submucosa. They believe that the

initial pathologic change is a weakening or collapse of the supportive structures rather than a widening and thinning out of the hemorrhoidal vein resulting in herniation of these vessels; this work needs confirmation particularly since photomicrographs have not been included in their article. (Also see Klemperer's remarks on collagen disease noted under ulcerative colitis. These apply particularly to hemorrhoids).

Fournier (118) listed six known anatomic factors that might be related to the pathogenesis of hemorrhoids, and stressed particularly (1) the lack of fascial support of the hemorrhoidal veins, and (2) the looseness of the submucous connective tissue of the anorectal region. Based on these anatomic concepts he advised an "obliterative suture" technique of hemorrhoidectomy to be discussed shortly.

Occupational strain. Zager (401) believes that muscular strain such as lifting and increased intra-abdominal pressure is a predisposing factor to hemorrhoid formation. He reported the histories of 3 workers who developed anorectal symptoms after heavy lifting or pulling and who had been granted compensation as the Workmen's Compensation Act pays for aggravation as well as for direct cause. (Also see *Am. J. Surg*, 1952, 84: 551).

Injectional treatment. Terrell (340) is continuing to champion sclerosing therapy for the treatment of uncomplicated internal hemorrhoids. These lesions should be small to medium in size and, preferably, nonprolapsing. If mild prolapse is present it should be spontaneously reducible. Terrell believes that this form of therapy may bring about not only symptomatic relief but also a cure comparable to that obtained after surgical treatment. On the other hand, Bacon and Moran (16) believe that for permanency of cure, hemorrhoidectomy is the procedure par excellence and that patients subjected to sclerosing therapy should be apprised of the limitation of this therapeutic regime. It is generally conceded that no one should treat hemorrhoids unless he is familiar with the injectional and surgical therapies.

Surgical treatment. Myers and Summers (257) described a "mucosa and skin-saving technique of hemorrhoidectomy." On paper the procedure looks acceptable. Blaisdell (44) believes that superior retraction and exposure in hemorrhoidectomy are best obtained by means of a 12 point suspension of a continuous suture with a ring retractor. When this method is utilized, the entire mass of mixed piles is made to lie in an almost flat plane wholly outside the anal sphincter muscle, and the demarcation between normal and pathologic tissue becomes sharp. This procedure is believed to lessen the dangers of injury to the sphincter muscle and the removal of either too much or too little tissue. As a result, the incidence of incontinence, stenosis, excessive pain, bleeding, delayed healing, and recurrence is reduced. Furthermore, the amount of normal tissue remaining with the use of the ring is greater than that left by other procedures. The technique of hemorrhoidectomy using the ring retractor is described in detail.

Fournier's obliterative suture method of hemorrhoidectomy is suitable for the treatment of small and medium sized internal piles. This technique is very simple in execution and is said to collapse the varicose hemorrhoidal veins and to fix the mucous membrane to the muscular layer.

Bacon and Moran (16) believe that the surgical procedure employed is of less importance than the manner of execution. They believe in Lister's maxim, "Success depends upon attention to details." Spinal anesthesia and the prone inverted or jackknife position of the patient on the operating table are favored because they offer proper relaxation and exposure of the anus and the lower rectum. Anal dilatation is unnecessary and scrupulously avoided, and sharp dissection is utilized for mobilization of the hemorrhoidal masses with separation of the subcutaneous component of the external anal sphincter muscle in order to avoid its inclusion into clamps or sutures. The mucosal wounds of the hemorrhoidal pedicle are approximated to the level of the mucocutaneous (pectinate) junction. No drains, packs, or plugs are ever used.

One of us (*Surg. Clin. N. America*, 1952, 32: 677) has recently described and illustrated two techniques of the open type of hemorrhoidectomy, and discussed the value of the open versus the closed procedures.

During World War II, an opportunity was afforded to compare and contrast the results of the open type of hemorrhoidectomy with the semiclosed and closed types of hemorrhoidectomy. The semiclosed method of hemorrhoidectomy was essentially the same as the open type except that the subcutaneous structures of the hemorrhoidal bed were approximated without suturing the skin. In the closed type of hemorrhoidectomy, the wound, including the skin, was closed following the removal of the hemorrhoidal mass.

Early in this investigation it became apparent that with the open operation even large hemorrhoids could be completely removed and that the postoperative course was smooth and uneventful. Seldom did a patient require more than two doses of morphine postoperatively, and about 40 per

cent of the patients required no morphine at all. But following the open operation the soldier was seldom discharged to duty in less than 3 weeks.

With the semiclosed type of hemorrhoidectomy considerably more morphine was required for postoperative sedation. Furthermore, the postoperative course in about 20 per cent of the cases was complicated by the onset of varying degrees of induration and tenderness in the wounds which in many instances, however, disappeared spontaneously. Sulfonamide and/or antibiotic drugs administered preoperatively and postoperatively had little effect on the incidence of development of this complication. However, in uncomplicated cases there was discernible a faster rate of healing of the wounds than in the controls; the wounds healed effectively in about 2 weeks. In spite of the disadvantages we favor this type of hemorrhoidectomy in civilian practice whenever the saving of time is of paramount importance.

Following the closed type of hemorrhoidectomy, the postoperative course was quite stormy in some patients. About four times more morphine was required for the control of postoperative pain after this than after the open operation. Over 50 per cent of the patients developed induration with considerable tenderness, which in a few instances eventuated in localized suppuration requiring drainage. Also, a number of patients developed relative anal stenosis after the closed type of hemorrhoidectomy. The definite advantage of the uncomplicated closed type of operation was the saving of duty or work hours, as the patient could be discharged in less than 10 days.

The closed type of hemorrhoidectomy is apparently not a procedure to be recommended in spite of its time-saving feature as this is offset by the high incidence of complications such as induration and occasional suppuration of the wounds and the occasional occurrence of relative anal stenosis requiring periodic digital dilatation.

Postoperative digital examinations are omitted by some proctologists (189), while most others wait until about the fifth day (189, 224) when epithelization of the wound begins. These are repeated every 4 to 5 days to promote healing of the wound from the bottom out and thus avoid bridging which may result in the formation of superficial fistulas. The lubricant used is of importance. Those containing local anesthetics are undesirable because they are frequent sensitizers (204) causing annoying anal and perianal dermatitis. The use of bland ointments, such as a cod liver ointment (Desitin), is desirable (357).

Prevention of posthemorrhoidectomy pain. For the avoidance of postoperative pain Maguire (224) advised the use of generous incisions in the perianus, the performance of a sphincterotomy, and the subcutaneous and submucosal injection of 95 per cent ethyl alcohol. Bloomenthal and Bendix (49) inject a sparsely absorbable, oil-soluble anesthetic directly into the external anal sphincter muscle at the time of operation to eliminate spasm and resulting pain. At the time of the present writing the profession is flooded with a new long-lasting, water-soluble anesthetic solution for this purpose. It may be stated most emphatically that after a properly performed hemorrhoidectomy there should be no need for the employment of these often disappointing and potentially dangerous (224, 351) anesthetic solutions; posterior sphincterotomy is certainly a wiser procedure. We have also been unimpressed with the alleged value of d-tubocurarine chloride (*Anesthesiology*, 1952, 13: 370). (Personal unpublished data).

Prolapsed hemorrhoid. For the relief of pain caused by prolapsing hemorrhoids, procaine hydrochloride injected intravenously has been employed by Schaft and Spendlove (314). Prompt surgery is preferred to this form of therapy.

With regard to the prophylaxis and treatment of complications of proctologic surgery, of which hemorrhoidectomy is most common, retention of urine, hemorrhage, adenomatous anal tags, delayed healing of wound, abscess formation, incontinence (see elsewhere in text), and stenosis have been discussed (272, 326). A plastic surgical procedure for the correction of postoperative anal stenosis has been described and illustrated (355).

PROLAPSE

Practically all authors agree with Moschcowitz (255a) that massive rectal prolapse involving all layers of the bowel (procidentia) is a sliding hernia of the anterior wall of the rectum and that the apex of the prolapse is the cul-de-sac of Douglas. Ripstein (299) has stated that this defect is brought about by stretching and atrophy of the transversalis fascia and the suspensory ligaments of the rectum. Jackman and Cannon (178) stated that in at least 10 per cent of the cases of prolapse in juvenile patients the condition may persist beyond childhood. In 14 of 100 adult patients they elicited a history of prolapse during childhood.

Many innovations and techniques have been proposed which suggests a state of therapeutic imperfection. Stabins (330) believes that a cure calls for complete fixation of the rectum, which necessitates division of the pelvic peritoneum and the bringing up of the prolapsed intestine into the abdominal cavity. Since any type of colopexy is

objectionable (it is a poor policy to fix movable organs to an immovable support—Hirschman), Stabins performs a one-stage resection of the prolapsed bowel with an immediate end-to-end anastomosis as well as restoration of the pelvic peritoneum. In short, the pelvic peritoneum of the bowel is incised on either side and anteriorly near the base of the bladder, the flaps are freed laterally as in an "anterior resection," and the rectum is mobilized from the hollow of the sacrum as in an abdominoperineal resection without division or damage to the superior hemorrhoidal vessels. With the rectum held taut, the redundant bowel is resected and an open end-to-end anastomosis is effected. We have employed this operation minus resection of the bowel three times with good immediate results.

An anterior resection type of operation was recently successfully performed for a huge procidentia in which, because of the disparity in the lumen of the resected bowel (the caliber of the rectal segment being wider), it was necessary to employ a Hoffmeister type of anastomosis (347).

Ripstein's (299) technique calls for the formation of a new pelvic floor by the employment of a graft of fascia lata after division and excision of excess peritoneum in the cul-de-sac. This procedure is said to provide adequate anterior support to the bowel and to restore the normal posterior curve of the rectum which is believed to be straightened in prolapse so that the bowel runs in a vertical position. A report of the late results of the combined abdominoperineal technique described by Dunphy (100) may be expected in the near future.

The foregoing operations fail, however, to restore the atonic sphincter muscles which have been stretched to various degrees by the prolapsed bowel. This feature can be overcome by the employment of a simple anoplasty or the Thiersch operation (see comments on the discussion of incontinence) or by the employment of our modification of the de Lorme technique (351).

Tordoir (346) employed the Thiersch operation for the treatment of prolapse in children. Recently one of us (R. T.) has successfully employed this operation in 2 adults and 2 children. The results are gratifying in all but 1 boy who is mentally deficient and whose stools cannot be regulated without recourse to enemas to which his mother and pediatrician objected. The removal of the silver wire after a lapse of 6 weeks has, however, resulted in the re-establishment of normal bowel habits with complete cure of the prolapse.

Occasionally, massive rectal prolapse is said to require an abdominoperineal resection (172).

FISTULA

Pyogenic. Anal fistula is a contracted cavity of a chronic abscess or the final product of an acute abscess. In all likelihood, the preformed anal glands, anal glands, anal ducts, and anal crypts are the sources of the initial acute infection (see discussion of anatomic considerations). The treatment of fistulas is always surgical once chronicity of the lesion has been established. Some operators prefer fistulotomy while others prefer fistulectomy (a technique that was known to Hippocrates) (369). The reviewers look with disfavor upon fistulotomy because they consider it an incomplete operation and it may be a fertile site for the development of malignancy many years after the operation (see chapter on pathology of cancer). On the other hand, fistulectomy disposes of the infected fistulous tract with its fibrous wall as well as the adjacent infected tissues, including the anal crypts and other anal preformed structures. Both low and high types of anal fistulas lend themselves to relatively easy repair, while anorectal fistulas (5 per cent of all fistulas) may pose serious therapeutic problems.

Wagner (369) believes that regardless of the number of tracts present, all must be excised at the first operation with the overlying tissues divided to permit healing to occur from the bottom out without fear of incontinence; this rule was promulgated by John Aderne more than 500 years ago. Wagner believes that persistence or recurrence of tracts which requires additional surgical intervention is an important cause of incontinence. If incontinence occurs as a result of complete excision of the fistula, it can be dealt with by an appropriate plastic repair (to be described elsewhere in the text). Actually, few fistulous tracts require complete section of the sphincter muscle as they seldom pass above the levator ani muscles; most of them pass only above the subcutaneous or superficial components of the external anal sphincter muscle or along the branching fibromuscular septums at the lower end of the longitudinal muscle of the rectum (101, 251, 390). Even when the deep component of the external anal sphincter muscle is incised in cross section, particularly posteriorly and laterally, it heals well if healing and contraction of the scar are not interfered with, usually by unintelligent packing. In none of Wagner's 122 cases did incontinence require a plastic procedure although 7 of his patients had adequate sphincteric control for formed stools only.

The reviewers prefer to avoid multiple incisions of the entire anal sphincter muscle during any one operation and therefore frequently, but not al-

ways, employ a two-stage operation (351). At the first procedure all fistulous tracts are excised down to the sphincter muscles. The channels or tracts traversing the sphincter muscle are threaded with a seton which is tied loosely. At the subsequent operation, which is performed after a firm scar has formed in the wound, the sphincter muscle is divided and the remaining portion of the fistulous tract is excised. This plan prevents the wide retraction of the severed ends of the sphincter muscle with resultant anal incontinence. It may be added that in our experience, the great preponderance of multiple anal fistulas have a common primary (internal) opening and are eminently suitable to the two-stage operative procedure.

Bishop (40) discussed the pathogenesis and treatment of anal fistulas occurring after the performance of an episiotomy. He believes that division of a preformed anal duct in the course of episiotomy may cause the formation of an anal fistula that terminates in the episiotomy wound. He discounts the popular belief that a suture passed in the rectum during the repair of the episiotomy is the cause of a fistula formation. The treatment is the same as that accorded the usual fistula-in-ano.

Smith and Hill (325) called attention to the occurrence and treatment of annular stricture resulting from complete or incomplete internal anal fistula.

Open versus closed surgical techniques. Sporadically, primary closure techniques are described. The reviewers have no doubt that in the hands of the advocates of such procedures, the results, certainly the immediate ones, are good. With Wagner (369) we are, however, unaware of reports of the large series of cases treated by primary closure in which the cases were followed up for a long enough period of time to permit an adequate evaluation of the closed operation. Furthermore, our experience parallels Wagner's; he, in a study of 58 recurrent anal fistulas, observed a recurrence rate of 72.8 per cent, or 42 patients who had previous fistulectomies performed with primary suture. At this writing, it appears that primary closure is still an ill-advised procedure and we have abandoned it after a fair trial.

Recently, Williams (392) advocated skin grafting of the wounds of anal fistulas. On theoretic grounds this procedure, although technically feasible, is as ill conceived as the primary closure techniques. In extensive fistulas when the sphincter muscle must inevitably be divided, the grafted skin, like gauze packing, will be placed between the severed ends of the sphincter muscle which prevents approximation, abets separation of the severed ends, and results in ineffective healing of the sphincter muscles which in turn will promote incontinence.

Tuberculous. Jackman and Smith (183) reported 2 cases of primary tuberculous anorectal fistula with possible spread to the lungs. The incidence of primary tuberculosis in the anorectum is about 1 per cent; perianal tuberculosis is usually secondary to tuberculosis in other parts of the body, namely, the lungs, urinary tract, and bones. Knapp (201) advocated curative surgical therapy for the tuberculous anal fistula supplemented by antibiotics (see chapter on antibiotic therapy). However, he employs a semiclosed procedure. Wagner (369) observed effective healing in average time, but Gerendasy (130) noted retardation in the healing of the wound although his final results were satisfactory.

Hidradenitis suppurativa about the perianal region is frequently confused with anal fistulas (75, 182). Incidentally, some of these cases responded to broad-spectrum antibiotic therapy (399), while other cases constituted a surgical problem (149).

INCONTINENCE

As a rule, incontinence follows either obstetric procedures or operations performed upon the anorectum; it occurs most often following the performance of an incompetent fistulectomy. Recently, a number of plastic procedures have been described. One of us (362) has, for the first time, utilized the Bunnell type of tendon suture in the repair of the severed but well dissected ends of the anal sphincter muscle for the successful restoration of continence. In Birnbaum's (39) procedure the dissection is less extensive; excessive scar tissue is removed en bloc but enough scar tissue is left at the muscle ends to receive and to hold firmly steel alloy sutures. The steel sutures are laid with each passing through a loop of a pull-out wire so that when the sutures are tightened the direction of the pull is tangential to the circumference of the sphincter muscle, the muscle ends to the apposed being held in the direct line. The sutures are secured to the surface of the skin with buttons. They are drawn up and tightened sufficiently to convert the longitudinal wound into a transverse one. The skin is protected by gauze placed under the buttons. A somewhat similar procedure but with mobilization of the severed ends of the sphincter muscle, suture of the bare muscle ends, and the addition of a preliminary, temporary colostomy is utilized by Leider and Peskin (207). Blaisdell (43) employs a muscle-bearing flap procedure without dissection and

suture of the bare ends of the sphincter muscle but without colostomy. Ingelman-Sundberg (176) described a plastic procedure utilizing the pubococcygeal muscle.

Gabriel (121) has recently resurrected the simple Thiersch operation for anal incontinence which, although never published, was practiced as early as in 1889 (96). Dodd has described well and illustrated an aseptic method of the Thiersch procedure (96). One of us (R. T.) has prepared a motion picture of the Dodd modification of the Thiersch operation.

STENOSIS OR SPASM (PECTINOSIS?)

This subject merits discussion because of the existing confusion. Newton and Mac Gregor (263) have described "a clinical entity of spasm and fibrosis of the sphincter ani, with marked constipation, chronic excessive use of cathartics, and vague symptoms of abdominal discomfort, anorexia, cramps, tenesmus, and flatus. Treatment consists of anal dilatation with or without partial division of the external sphincter." Morton (253) subscribed to the foregoing and reported its occurrence in 90 private patients seen during a period of 12 years. Spiesman (328) stated that so-called pecten bands are absent in normal rectums but that these are a distinct pathologic entity. He failed to recognize that the "band" lying beneath the pectinate line actually resides within the subcutaneous component of the external anal sphincter muscle and may be composed of fibrous and muscular or only of muscular tissue (101). Our own observations tend to the belief that this syndrome consisting of narrowing of the anal canal with spasm and/or fibrosis of the anal sphincter muscle is, in some cases, produced by dysfunction of either the subcutaneous component of the external anal sphincter muscle or the muscularis submucosae ani which is situated in the region of the pectinate line (see discussion on anatomy). In other individuals, inflammation and infection of the anal glands, ducts, and crypts with resultant fibrosis, which involve the subcutaneous component of the external anal sphincter are responsible. In still other persons this syndrome may be the outcome of an anxiety-determined hypertonus of the anal sphincter (191).

It should be pointed out that digital dilatation of the anal canal even under anesthesia is a traumatic, nonsurgical procedure and is usually ineffective. Though practicing in the same hospital, Dunphy (101), unlike Newton, recognized this when he wrote that dilatation "sometimes causes sufficient hemorrhage to produce recurrent fibrosis," and therefore advocated a formal sphincterotomy. The latter, incidentally, is frequently confused with pectenotomy which is an incomplete and hence an undesirable surgical procedure devoid of permanent results. The techniques of the classic and modified posterior types of sphincterotomy have been described and illustrated (355). These procedures, because of the smooth convalescence and the inevitable successful issue, are definitely preferable to the ill conceived "pectenotomy" and the unsurgical and usually ineffective digital dilatation (253) even when combined with "partial division of the sphincter muscle" (263).

PRURITUS

Anogenital pruritus remains an enigma. The multiplicity of therapeutic procedures proposed suggests that none is entirely satisfactory.

Comedos in the perianal skin may be a cause of severe itching (2). The passage of tryptic enzymes with the stool is believed to cause pruritus (367); in some cases this can be overcome by the administration of suppositories containing sodium lauryl sulfate which forms inactive protein complexes. This form of therapy is practically ineffective in the presence of local proctologic disorders (367). Some patients with anal pruritus that is recalcitrant to established forms of treatment respond to the topical application of an antihistaminic drug (360). Still other patients respond to a similar application of derivatives of the lower fatty acids; it is conjectured that pruritus in these patients is the result of the reduction or absence of normally present lower fatty acids in the skin, and that this deficit is made up by the application of the fatty acid drugs (360). Procaine hydrochloride administered intravenously has been employed for the control of anogenital pruritus. Complete relief was obtained in less than 20 per cent of the cases, temporary relief in from 43 to 54 per cent, while no relief was obtained in from 29 to 38 per cent (30).

Hyperhidrosis in the anogenital region, which may be a cause of pruritus, can be combated by the oral use of banthine (56) and prantal (259).

The value of corticotropin (ACTH) in pruritus is now in the process of evaluation (120) by one of us (*J. Am. M. Ass.*, in press).

The undercutting operation of Ball with complete removal of proctologic lesions (349) or with the subcutaneous implantation of gelatin sponge (303) has found recent advocates. Rosser (303) noted "the least satisfactory results in those individuals with chronic skin changes and no associated lesion" (proctologic). It should be stressed that this type of pruritus responds well to tattooing of the perianal skin with mercury sulfide (351).

PILONIDAL DISEASE

Pilonidal disease, though superficially located, has nevertheless produced a deep cleavage of opinion regarding therapy. This is typified by the following two articles: Palumbo, Larimore, and Katz (268) believe that "the open method of excision and packing results in the greatest number of cures in the treatment of pilonidal cysts and sinus disease, whereas, O'Neill (266) believes that a "defeatist attitude toward primary closure is not justified in view of the good results which have been obtained. Primary closure should be attempted in about 85 per cent of all patients." We (361) have devoted a complete review to this subject and have shown that the gluteal fascia technique (168a) is a well conceived and a highly satisfactory operation. Surgical virtuosity is not a prerequisite to performance of this reconstructive procedure.

Williams (392) agrees with one of us (350) that skin grafting following disposition of the pilonidal lesion with intermediate or thick split-thickness skin grafts has merit, but he disagrees with our warning that grafted skin in the sacrococcygeal area cannot withstand the strain incident to full military physical duty status or the corresponding stress and strain of civilian pursuits. We have observed excoriation or fissuring in 4 of our 8 patients. The grafted skin constitutes a relatively thin covering over the sacrum and coccyx with little or no intermediate protective subcutaneous adipose tissue. As in the case of the thin and wide scar following the open operation, grafted skin is similarly vulnerable to trauma. This difficulty could perhaps be avoided by the employment of tubed, full-thickness grafts. Among other considerations, it was this weakness of the open operation and grafted skin that led us to adopt the Holman procedure which provides an adequate cushion against the bony structures.

Since the completion of this review a few articles on pilonidal disease have appeared in the literature. The article by Kleitsch and Cherry (199a) is discussed at some length because of its controversial character.

The authors have advocated a technique of "conservative enucleation of the sinus and granuloma." Of 118 among 167 so-treated patients, 28 were lost to follow-up for the period of a year. Among the remainder a rate of recurrence of 9.3 was noted; 5.9 per cent of these cases were "true recurrences"—the result of incomplete removal of epithelial tissue, sinuses, or both at the time of the original operation.

It is quite conceivable that had the 28 "lost" patients been traced, the incidence of recurrence would have been higher. Parenthetically, it may be added that follow-up studies based on a questionnaire in contradistinction to personal re-examination are at best not too reliable as asymptomatic recurrences are missed for some time. This high rate of recurrence alone does not commend this operative procedure as a "rational" treatment. Furthermore, from personal experience we know that while this technique is satisfactory for small lesions it is not satisfactory for the treatment of large cysts and/or sinus tracts.

The authors condemn "block dissection" as "there is no place for 'en bloc' dissection in the treatment of benign conditions." Is it not yet generally known that because of the few complications and consistently good results obtained, many surgeons, some even of wide experience, continue to favor this operation in spite of the prolonged period of healing?

Kleitsch and Cherry claim that the musculofascial flap procedures "are entirely too complicated to be considered good treatment for pilonidal sinus. It is like doing a hemicolectomy for appendicitis or a proctectomy for hemorrhoids." However, many experienced surgeons (Holman, Pope, Mohardt, Shute and Burch) have found these reconstructive gluteal fascia flap techniques to be satisfactory for the treatment of large uninfected primary and recurrent cysts and sinuses (361), and their work has been confirmed most recently at a Veterans Administration Hospital (167a) in a comparative study of the open, partial, and complete closure techniques.

Yet these authors are not quite correct in their statement, "Irradiation of a pilonidal sinus is not generally accepted as the best treatment." Roentgen therapy has not been claimed to be the "best" treatment; on the contrary, it has been stated that roentgen therapy has barely any usefulness for the treatment of primary lesions (361). Irradiation was "advocated as a substitute for operation for recurrence of infected sacrococcygeal sinus "(*Surgery*, 1940, 8: 469).

Kleitsch and Cherry consider local infiltration anesthesia the anesthetic of choice and cite 4 references in support of their contention. Although the literature was reviewed from 1940 to 1950 for this study, these authors, nevertheless, failed to include a single reference in opposition to their view. Some military surgeons (55b) have reported severe infections following local infiltration anesthesia but none following spinal anesthesia. Significantly, Brockbank and Floyd had noted that after spinal anesthesia the average period of hospitalization of militarized personnel was 21.1 days, whereas the hospital stay following

local or infiltration anesthesia was 46.8 days. Other types of regional or inhalation anesthesia are equally useful. To state that infiltration anesthesia "is so far superior to other types of anesthesia that it can be objected to only by those unfamiliar with the technique" is unwarranted.

Buie (59a) is adhering to his so-called "marsupialization" operation which utilizes portions of the scar tissue or the cyst wall. He listed 12 advantages in favor of this operation. One of them is that the rate of recurrence is negligible, although no figures are presented. Another of the advantages is that "it is not necessary to make deep wounds which involve the sacral fascia or periosteum." For comment on this statement the reader is referred to the studies of Pope, Holman, Mohardt, Hoffert, and Healy, and our own (361). One of us (R. T.) has abandoned the marsupialization technique because he considers it an incomplete surgical procedure. Our procedural policy is to remove all of the cyst wall and any scar tissue (which on microscopy is frequently found to be infected); even the rarely reported occurrence of a neoplasm in the cyst wall favors total ablation of the cyst (361). (See comments on cancer arising in sinuses and fistulas elsewhere in the text).

PEDIATRIC ASPECTS

The subject of pediatric proctology has become so vast that a separate review was deemed advisable and was published recently (356). The interested reader is referred to this special review. A new review is now in the process of preparation.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

A Special Method of Reduction (Without Operation) for Irreducible Luxations of the Mandible. CIHAT BORCBAKAN. *Oral Surg.*, 1952, 5: 956

In cases of temporomandibular luxations, simple reduction should first be attempted. If this is inadequate, anesthesia should be administered and reduction then is often successful. If this is impossible, a special method of reduction, without surgical intervention, is used. This latter method is only rarely necessary—in those instances in which the discus articularis is turned backward or folded upon itself.

Arches of stainless steel wire were made for both the upper and lower jaws and were fastened to the teeth with soft stainless steel wire. A hook was added to each side of the arch, and with a small pad of gauze between the molar teeth, acting as a fulcrum, constant traction was applied between the forward portions of the upper and lower arches. With this gradual force overcoming the contraction of the ligaments and muscles of the joint, the condyle will jump over the tuberculum articulare and return to its proper position within 2 or 3 days.

HERBERT J. KAROL, M.D.

Preservation of the Facial Nerve in Operations for Benign Conditions of the Parotid Area. LOUIS T. BYARS. *Ann. Surg.*, 1952, 136: 412.

The accidental severance of the facial nerve in operations for benign lesions of the parotid gland is largely avoidable provided that the surgeon is familiar with the anatomy of the facial nerve and has the patience to carry out a simultaneous dissection of the nerve. Blair, Adson, and Brown have previously emphasized that the facial nerve should and can be preserved. The author presents a new method of identifying the nerve within the substance of the gland so that it may be visualized and avoided.

The facial nerve emerges below the inferior margin of the ear canal deep to the parotid, and divides a short distance anterior to the canal. The two branches run forward—one upward, the other downward. The smaller fibers abruptly become superficial at the anterior margin of the gland. Every tumor of any size within the substance of the gland displaces the nerve. The tumor may be superficial or deep to it, and may even encroach and displace both major divisions. Adequate exposure must be obtained under general anesthesia with the entire side of the face draped to permit observation of twitching. The incision extends along the anterior and inferior margins of the ear, then behind the ear and down a crease of the neck, and leaves no unsightly scar on healing. The identification of the lower division of the facial nerve is made easy by its relationship to the posterior facial vein, which arises superior to the gland, courses down through its substance, leaving the gland at the anterior central portion of its lower tip and going deep to the sternomastoid to terminate in the common facial vein. The vein is located by freeing the lower pole of the gland from the fascia of the sternomastoid, starting posteriorly and going forward along the lower border of the gland until the vein is encountered. A large branch of the inferior division of the nerve will be found just anterior to the vein in the substance of the gland, and by following this branch the major division will then be found passing either deep or superficial to the vein. One must realize that a nerve strand stretched over the surface of a tumor appears hairlike and unimportant, but after pressure is relieved, attains significant size. Where the nerve fibers are intimately involved with the tumor, the dissection is carried out on the nerve rather than on the tumor.

It is fairly well agreed that nearly 25 per cent of tumors in this region possess some degree of malignancy. In the interests of safety and comfort, most parotid tumors should be excised. Clinically benign freely movable tumors are removed conservatively without preliminary biopsy. In those cases suggestive of malignancy, preliminary biopsy studies, preferably with definitive permanent pathologic sections, should be done and followed by radical operation with resection of the nerve.

The same principle of facial nerve identification and dissection is also applied to the removal of parotid calculi and drainage of suppurative parotid infections. Finally, in the suture of the facial nerve, it is far easier to locate the nerve by this method and trace it back to the severed ends, since the attempt to approach the nerve through the old scar is extremely difficult and sometimes impossible.

CARL SCHILLER, M.D.

EYE

Ocular Cystinosis. HARRIET G. GUILD, FRANK B. WALSH, and RICHARD E. HOOVER. *Am. J. Ophth.*, 1952, 35: 1241.

Ocular cystinosis is characterized by the deposition of cystine crystals throughout the cells of the reticuloendothelial system. Most cases include chronic acidosis and renal glycosuria. An intractable rickets is often the presenting complaint.

The condition must be distinguished not only from simple vitamin D-resistant rickets, in which the

rickets progresses in spite of adequate vitamin D therapy but also from ordinary renal rickets which is a complication of renal insufficiency.

External examination of the eyes reveals slight haziness of the corneas without inflammation or vascularization. There is, however, one single important clinical finding which is detectable on slitlamp examination, namely, the presence of refractile rod-shaped or needle-shaped particles situated in the superficial stroma and uniformly distributed throughout the corneas of both eyes. There were no crystals in or near Descemet's membrane. Crystals were present in the kidney, spleen, lymph nodes, liver, supporting tissue of the lung, gastrointestinal tract, thymus, testes, and bone marrow, but they were absent in the thyroid, the pituitary, the pineal body, the brain, and in the cord.

It has been shown (Walsh and Howard, Cogan) that hypercalcemia may present a specific eye picture best identified by the use of the slitlamp. This manifestation of hypercalcemia in the eye is pointed out because cases characterized by cystinosis require intensive vitamin D therapy which may result in a very high blood calcium with calcium deposits in the cornea; however, the slitlamp picture of hypercalcemia is entirely different from that of cystinosis. If slitlamp examination is omitted, other corneal affections might be confused with cystinosis, e.g., Hurler's syndrome, band-shaped keratitis (hypercalcemia, one cause), corneal changes seen in Still's disease and in cases associated with high blood cholesterol as described by Toth.

It is emphasized that the diagnosis of cystinosis can be established not only by microscopic examination of the bone marrow but also by examination of the corneas. Examination of the bone marrow in adults presenting crystalline dystrophy of the cornea should prove informative.

JOSHUA ZUCKERMAN, M.D.

Further Efforts to Influence X-Ray Cataract by Chemical Agents. LUDWIG VON SALLMAN. *Arch. Ophth.*, Chic., 1952, 48: 276.

Radiobiological effects are produced by direct hits of single ionizing particles upon sensitive parts of irradiated cells. However, studies on the effect of x-rays on aqueous solutions of various chemical substances indicate that indirect biochemical mechanisms mediate some of the actions of ionizing radiations. Of these processes, the production of active radicals by the ionization of water is best understood. In vitro investigations on solutions of highly polymerized desoxyribonucleic acid and on sulfhydryl enzymes have shown that the effectiveness of the radiation is decreased in the presence of other solutes. In other words, chemical agents can protect irradiated compounds against x-ray effects.

It was found that cysteine intravenously administered had a strong protective action against radiation damage to the lens and hair follicles of rabbits when it preceded the exposure of the eye to 1,500 roentgens—a protective influence which has persisted 18 months so far. When cysteine was injected subconjunctivally twice weekly for 3 weeks after the irradiation of cysteine-pretreated rabbits, it was observed that the fine cortical opacities were not reduced by the additional therapy.

Subconjunctival injection of 1 c.c. of 8 per cent solution of cysteine prior to irradiation was moderately beneficial in preventing the damage to the lens induced by local exposure of the eye to 1,500 roentgens.

When the microscopically visible changes in the lens which develop in the first 2 or 3 weeks after x-irradiation with 1,500 roentgens were analyzed, it was found that almost all lesions were less pronounced in the cysteine-pretreated eyes than in the eyes rayed before the use of cysteine.

Inhibition of cell division, recovery, and compensatory increase of mitotic activity of the lens epithelium induced by x-rays differed very little in cysteine-pretreated animals and in nonpremedicated controls.

Glutathione and thiourea were less effective than cysteine in increasing the radioresistance of sensitive elements of the lens. Sodium thioglycolate and dimercaprol (Bal) were ineffective. Pretreatment with other reducing chemical agents (dihydroxyacetone and tocopherol), with the citrovorum factor and with cyanide did not reduce the injurious effect of 1,500 roentgens applied locally to the rabbit eye.

JOSHUA ZUCKERMAN, M.D.

Choroideremia. Clinical and Genetic Aspects. ARNOLD SORSBY, A. FRANCESCHETTI, RUBY JOSEPH, and J. B. DAVEY. *Brit. J. Ophth.*, 1952, 36: 547.

Choroideremia was studied in three families whose pedigrees were investigated over three generations Numerous excellent fundus pictures are presented many in color. Comparisons made after an interval of 13 years clearly demonstrate the progressive nature of this disorder in the male. The choroidal vessels become unmasked and sclerosed before disappearing. Almost to the end a reddish central area is retained as well as a ring of intact retina around the disc. The process spreads very slowly from the periphery towards the center with retained islands here and there. The fundus reflex changes from red to yellow, and then to white.

The symptoms are similar to those of retinitis pigmentosa. Night blindness is frequent and the central vision may remain good after the peripheral fields are extremely constricted. Blindness rarely sets in before the age of 40. Choroideremia is an independent entity unrelated to retinitis pigmentosa. Only men are fully affected.

The evidence of intermediate sex-linked inheritance is conclusive. In the progeny of an affected male, all the sons are unaffected and all the daughters show the disturbance in the carrier state, which is ophthalmoscopically recognizable if suspected. The carrier fundi show the following diversity: (a) exclusively peripheral disturbance of the pepper and salt type which may have a pigmentary overlay;

(b) peripheral involvement with mottling of the central areas; (c) peripheral involvement with a marked central reaction which, however, does not affect visual acuity. In the woman carrier, the dark adaptation curve is usually normal, no subjective symptoms are present, and the condition seems to be essentially stationary. In the progeny half the sons are affected and half of the daughters are carriers.

Before the ophthalmoscopic picture of choroideremia is fully developed the definite diagnosis can be made only with the help of a full family history. An affected man must have a mother who shows the carrier state. JAMES E. LEBENSOHN, M.D.

Radioactive Di-Iodofluorescein in the Diagnosis of Intraocular Tumors. P. D. TREVOR-ROPER, K. A. NEWTON, and J. P. NICHOLSON. *Brit. J. Ophth.*, 1952, 36: 543.

Phosphorus 32 emits beta rays with a maximum range in tissue of about 7 mm., but di-iodofluorescein with iodine 131 incorporated emits gamma rays which penetrate several centimeters of tissue. The latter would consequently seem preferable as a diagnostic test of intraocular tumor. To avoid radiation hazard, not more than 1 mc. of radioiodine was administered. Geiger counting was begun 2 to 4 hours after intravenous injection. The count rate over the thyroid did not greatly exceed that over the thigh, indicating that the iodine of the dye was not readily taken up by the gland, and consequently involved little radiation hazard to it.

Eight cases of malignant melanomas and 1 case of retinoblastoma were investigated. No significant differential between the uptake of the radioactive dye in the affected eye was noted in these cases as compared with that in the rest of the body; hence this technique cannot be recommended as a diagnostic procedure. JAMES E. LEBENSOHN, M.D.

EAR

Anatomical Considerations of Ménière's Disease. A. C. FURSTENBERG. *Ann. Otol. Rhinol.*, 1952, 61: 692.

The author states that Meniere's disease is assumed to imply a lesion of the internal ear. The stimuli are carried into the brain from the ampullary ends of the semi-circular canals over the vestibular nerves with cells of origin in the vestibular ganglion, and end in the four vestibular nuclei (superior, medial, lateral, and inferior) and in the cerebellum. The medial and lateral vestibular nuclei are believed to be related particularly to impulses from the horizontal canals. From the medial and lateral vestibular nuclei, fibers cross the midline and ascend in the medial longitudinal fasciculus to the abducens nucleus where they synapse with motor neurons supplying the lateral rectus muscles, and with para-abducens cells. These latter cells send their neuraxes forward through the medial longitudinal fasciculus to the portions of the oculomotor nuclei supplying the contralateral medial rectus.

Irritative lesions of the lateral or the medial vestibular nuclei produce a horizontal nystagmus with the quick component toward the side of the irritation. Irritative lesions of the superior vestibular nuclei produce a vertical nystagmus by similar connections through the medial longitudinal fasciculus. Irritation of all the vestibular nuclei or the vestibular nerve may produce a rotatory or irregular nystagmus.

Intercalated neurons from the medial vestibular nucleus carry impulses to the dorsal efferent nucleus of the vagus. This nucleus has preganglionic neurons distributed by way of the myenteric plexus (ganglia) in the walls of the digestive tract to the smooth muscles of these organs, including the stomach. Consequently, stimulations of the vestibular apparatus may set up a reverse peristalsis with nausea and vomiting. (Pain in the stomach is mediated over splanchnic nerves.)

Burning sensations in the pharynx, numbness on one side of the face, or a typical tic douloureux occasionally are described as being part of the syndrome; however, the author states that it is impossible to reconcile these findings, based on known anatomical pathways, with an isolated lesion in the internal ear, and in such a case further study of the central nervous system is necessary.

JOHN J. BALLENGER, M.D.

NOSE AND SINUSES

Papillary Sinusitis. A. F. JUDGE. *Ann. Otol. Rhinol.*, 1952, 61: 625.

After studying photomicrographs and perusing the literature, the author believes that the term "papillary sinusitis" can be used to cover various other conditions, e.g., epithelial polyp, epithelial papilloma, diffuse or soft nasal papilloma, and fibro-epithelial polyp.

He considers papillary sinusitis to be rare, occurring only 9 times in a series of 1,200 specimens during 3½ years.

The author mentioned the possibility that the lesion might be precancerous in nature although agreement on this score is not complete.

If one accepts the possibility of virus infection as the cause, the use of aureomycin to supplement surgery may prove effective.

JOHN J. BALLENGER, M.D.

NECK

The Bizarre Behavior of Thyroid Cancer. JOHN A. DUNCAN, SIMEON T. CANTRIL, and PAUL K. LUND. *West. J. Surg.*, 1952, 60: 435.

In a study of 33 patients seen between 1942 and 1951 at the Tumor Institute of the Swedish Hospital, Seattle, the authors discuss their experience with cancer of the thyroid gland. The difficulty in diagnosing malignancy in the thyroid gland by microscopic examination is emphasized, as is the difficulty of histologic classification of thyroid can-

cers. Many of them lack homogeneity and also show a variance in microscopic findings between the primary focus and the metastases. The authors utilize the classification of Warren which emphasizes a correlation between morphologic characteristics and clinical behavior.

Group I. Low malignancy: papillary cystadenoma with invasion; alevolar adenoma with invasion.

Group II. Moderate malignancy: papillary adenocarcinoma; alevolar adenocarcinoma.

Group III. Small cell—compact or diffuse; giant cell; Hurthle cell.

Malignancy occurs with sufficient frequency in localized nodules of the thyroid gland to justify excision in practically all cases. The authors support the contention that practically all lateral thyroid tumors are metastases from cancer of the thyroid gland. They are usually papillary adenocarcinomas; the primary lesion in the gland is usually in the homologous lobe and is usually so small that it is overlooked. In spite of the fact that surgical excision of localized nodules of the thyroid gland are most frequently prophylactic, the authors believe that recognizable carcinoma occurs sufficiently often to justify the operation. They make a plea for subtotal lobectomy including the adenoma and a good margin of thyroid tissue, in place of enucleation, and they stress the point that care should be taken to avoid rupture of the capsule. Surgical excision of the tumor and its cervical metastases appears to be the treatment of choice except in rapidly fulminating cases, and this together with postoperative irradiation was employed in the majority of cases in this series. The authors express some unwillingness to perform a radical neck dissection when an adenoma is declared malignant in the absence of cervical lymphadenopathy. In addition to the removal of any lateral thyroid nodules, excision of the almost constant primary lesion in the thyroid gland is essential and usually is accomplished by an homologous hemithyroidectomy.

In keeping with the varied biological properties of cancer of the thyroid, a wide variability in response to irradiation is noted. When adequate surgical removal can not be accomplished, irradiation therapy is a valuable supplementary adjunct. The choice between x-ray therapy and I^{131} will, to a large extent, depend upon the avidity, either initial or induced, of the cancer to retain I^{131}. I^{131} has proved to be of particular value in the identification of distant metastases. Its therapeutic use in lesions beyond the bounds of complete surgical excision is limited by the fact that uptake is insufficient in most instances to produce a cancericidal effect. A brief discussion is given concerning methods of stimulating uptake in metastases from cancer of the thyroid, but to date it is thought none of the series reported appears large enough to define conclusively the best methods of utilizing radioactive iodine in the therapy of metastatic thyroid cancer. Selected cases are cited as examples, and a very valuable discussion is presented. ALLAN D. CALLOW, M.D.

The Effects of Adrenocortical Stimulation on Thyroid Function: Clinical Observations in Thyrotoxic Crisis and Hyperthyroidism. D. EMERICK SZILAGYI, ARTHUR B. MCGRAW, and NICHOLAS P. D. SMYTH. *Ann. Surg.*, 1952, 136: 555.

In an endeavor to better understand the physiologic interrelationship of the thyroid and the pituitary-adrenal endocrine system, corticotropin was administered to a group of patients suffering from thyrotoxic crisis and hyperthyroidism. The clinical effects were observed in 3 cases of severe thyrotoxic crisis that had appeared unresponsive to other measures, and in 5 cases of hyperthyroidism (in 4 cases due to Graves' disease and in 1 case to an adenomatous goiter which had presented unusual difficulties in preoperative preparation). The drug reaction was followed by means of serial determinations of blood cholesterol, protein-bound iodine, basal metabolic rate and radioiodine (I^{131}) uptake and excretion.

Corticotropin appeared helpful in thyrotoxic crisis but only moderately so in the patients with hyperthyroidism, although all withstood the surgery remarkably well.

It was concluded that corticotropin therapy does not seem to offer any useful addition to the current methods of medical treatment of hyperthyroidism. In patients with thyrotoxicosis, however, who require surgical treatment and in whom conventional medication is partly or wholly ineffective, corticotropin is a helpful agent of preoperative preparation. The use of hormones in the treatment of thyrotoxic crisis likewise seems justified.

The method of drug operation is believed to be through the anti-stress response of the adrenal cortex. STEPHEN A. ZIEMAN, M.D.

Discussion on the Operative Removal and Plastic Repair in Cases of Carcinoma of the Hypopharynx and Upper Esophagus. R. D. OWEN, EMLYN LEWIS, J. P. REIDY, V. E. NEGUS, and Others. *Proc. R. Soc. M., Lond.*, 1952, 45: 255.

R. D. OWEN. Accurate localization is required for the operative removal and plastic repair of carcinoma of the hypopharynx and upper esophagus. The five starting points of epithelioma of the hypopharynx are (1) the aryepiglottic fold, (2) the pyriform fossa, (3) the lateral pharyngeal wall, (4) the posterior pharyngeal wall, and (5) the posterior cricoid area, and the cervical esophagus may be included. The resulting lesions differ in symptoms, prognosis, and treatment. A lateral, transthyroid pharyngotomy may be used for (1) an early aryepiglottic fold lesion, (2) an early lateral pharyngeal wall lesion, (3) a lesion of only the posterior pharyngeal wall, and (4) an early upper esophogeal lesion. The only treatment for pyriform fossa carcinoma is pharyngolaryngectomy.

In early lesions of the pyriform fossa, a unilateral block dissection is first done, then removal of the thyroid lobe, the hyoid bone, the larynx, and the involved segment of pharynx, starting from above

downward. A strip of posterior pharyngeal wall in continuity with the esophagus is retained for plastic repair. The pharynx is closed before the larnyx is detached from the trachea. When the posterior pharyngeal wall and posterior aspect of the larynx are also involved, the posterior mucosal strip is not available for repair. A pharyngolaryngectomy must then be done, with removal of a complete segment of pharynx.

Posterior cricoid carcinoma, more frequent in the female, is usually advanced to the arytenoids, with or without fixation of the vocal cords. The spread is frequent, both laterally and downward. Removal is possible only by pharyngolaryngectomy. Excision presents no actual difficulty. The real problem is repair and restoration of function. In the past the repair has been done in stages, but during the past 2 years primary closure with skin grafting has been attempted. Local growths of the posterior wall of the laryngopharynx may be locally excised, as may localized growths of the cervical esophagus. A complete segment of the lower pharynx can be removed through a left lateral pharyngotomy. The defect thus made can be repaired by making a gutter with a good lateral skin graft, which method was devised by Trotter over 30 years ago and modified by Wookey. The Wookey lateral flap is reliable provided the blood supply to the upper portion of the sternomastoid is intact. Removal of the sternomastoid during extensive block dissections may jeopardize this flap. Undue tensions are avoided especially at the cutaneous-esophageomucosal approximations. It is important to avoid abductor fixation of the cords which occurs (1) from injury of the opposite (right) recurrent laryngeal nerve during extreme rotation of the larynx during dissection, (2) from suture of the skin flap too close to the arytenoids, or (3) from subsequent scarring and fixation of the posterior aspect of the larynx and the skin to the prevertebral fascia. In the event of cord fixation, a permanent tracheotomy is required. A poor bridge of skin may result between closely placed tracheal and lower esophageal stomas. The author prefers U-shaped flaps.

EMLYN LEWIS discusses plastic repair and indicates certain technical details concerning the flap covering the prevertebral fascia or the posterior surface of the larynx during lateral pharyngotomy as described by Trotter in 1913. He states that the best dressing for a raw surface is a skin graft. The reconstruction following removal of the larynx should be done as soon as possible, even in one operation, with or without a skin graft. Delaying repair is uncomfortable and predisposes to whispering speech. The new gullet is constructed by wrapping a skin graft, raw surface outward, around an artificial lumen made of portex or other stent. The expanded upper end is fixed in the pharynx by a purse string suture while the lower end lies snugly in the esophagus. To assure apposition between the graft and the undersurface of the flap, pressure is applied by carefully packing wool which is impregnated with paraffin and flavine over the surface of the neck and holding it in position with lastinet. The head and neck are immobilized with dressings or plaster of paris for 10 to 13 weeks to counteract the contraction of the graft. Intermittent dilatation is performed later to prevent stricture.

The skin flaps when laterally based are limited in width and may thus be inadequate for suture of their lower margin to the cut end of the esophagus without tension, particularly when the esophagus is cut low. The standard flaps cause vertical shortening. T-shaped flaps produce vertical scars which are not well vascularized. The U-shaped flap is preferred. It is based above at the mastoid process and can be made as long as desired, the curve of the U being brought down, even over the chest wall as far as necessary. In a primary repair, the skin suture is far removed from the graft area, while in secondary repair, the flap for lining can be made within its confines, which avoids the crossing of scars. Because of the adequate length one is assured of a healthy skin flap between the cut ends of the trachea and esophagus, regardless of the level.

In a successful Wookey repair the flap must be long enough and in transverse section it assumes a shortened, broad lateral S with the top end of the S continuous with the skin on the left side and the lower end passing on to the raw surface on the right side of the neck. The raw surface on the right side must then be grafted. The S-shape requires meticulous suturing of the skin to the mucosa and the transfixing of sutures to the prevertebral fascia especially over the right side. The "S" is maintained by placing a tube in the pharyngeal gutter. The lower part of the "S" is gently strapped over the tube onto the left side of the neck. The lining suture should be offset from the covering suture. The hyoid bone is removed at the primary operation, which provides some anteroposterior collapse of the pharyngeal stoma and reduces movement at the suture line. A gastrostomy permits restriction of the oral feedings to only liquids. Primary x-ray therapy in operable cases is contraindicated because, besides producing edema, the repair may subsequently break down because of the postirradiation effects. Hair in the constructed lumen is removed as and when it causes trouble. Certain points in the successful repair require (1) oblique division of the esophagus, and (2) a flap somewhat larger than actually required and as thick as possible and, if necessary, including part of the sternomastoid. Undermining of the flap should be minimal and the flap should never be sutured under tension. Suturing should be of the vertical mattress type to evert the suture line, and skin-to-mucosal suturing must be accurate to avoid stricture. Suture knots in the lining flap should be within the lumen. Overlying suture lines are to be avoided. It is wiser to leave raw surfaces than to close with tension. Raw areas should be grafted; this is believed to be imperative for the successful fixation of the head and neck in the postoperative period.

GAVIN LIVINGSTONE. The results of treatment of cricoid carcinoma are gloomy. The results of x-ray therapy are poor and also interfere with the surgical treatment. This carcinoma requires extensive surgery with total removal of the larynx, the whole of the lumen of the involved segment of the esophagus, and all muscles attached to the larynx, the hyoid bone, and as much of the trachea as necessary. The whole thyroid gland should be removed on slightest suspicion of its involvement; this makes the construction actually easier. This author does not favor gastrostomy. The author prefers the Z-shaped incision and states that the gullet may be reconstructed at the primary operation by means of a Thiersch skin graft wrapped around a large polythene or portex tube. The tube should be funnel-shaped at the top. The polythene tube is left in place for 3 weeks instead of 6 months as previously advocated because of stenosis. Three points are emphasized in the treatment: (1) radical surgery is recommended because x-ray therapy is so disappointing, (2) the only operation to be done is total pharyngolaryngectomy, and (3), if possible, reconstruction of the gullet should be done at the primary operation.

J. P. REIDY confines himself to cases of carcinoma of the pyriform fossa and postcricoid carcinoma. In these, laryngectomy or total pharyngolaryngectomy is indicated. Excision is done as widely as desirable, and the plastic surgeon completes the repair. Various techniques of lateral pharyngectomy with transverse skin flaps to reconstruct the portion of the cervical esophagus are quoted from Trotter's Hunterian lecture. The transverse skin flap has certain limitations; it is to be used only for limited excisions because of the risk of sloughing at its free end. Preoperative irradiation enhances the risk of skin flap necrosis. Laryngectomy opens the pharynx and upper esophagus and it is preferable to repair this wound primarily. A permanent tracheostomy is done. Following excision, the following procedures may be followed: (1) closure of neck wounds with skin flap or flaps over the prevertebral tissues and long term reconstruction of the cervical esophagus with flap skin for lining and for cover; (2) immediate reconstruction of the cervical esophagus with a skin graft on a tube; and (3) a combination of 1 and 2. Long term reconstructions require weeks while the patient constantly dribbles saliva down the front of his neck. There is also the risk of inhalation bronchopneumonia. Z-plasty flaps give better exposure than the transverse or H-flaps and can be adjusted to each other when sutured to give close apposition to the underlying tube and graft. The graft-covered tube must fit snugly, and head and neck fixation must be good. The tube should be removed between 2 and 4 weeks, and followed with a barium swallow and a roentgenogram to outline the lumen of the new esophagus.

In this author's experience, immediate reconstruction with a graft on a tube should not be done when a tracheotomy already exists. The risk of infection is too great and the whole graft may break down; also, inhalation bronchopneumonia may occur.

An adequate balanced diet is given through a Jacques tube. After-treatment includes lessons from the speech therapist in esophageal speech, which most patients find difficult after total pharyngolaryngectomy but easier after laryngectomy. An artificial larnyx may be used.

V. E. NEGUS reported the use of a plastic tube in the repair but does not favor the U-flap.

RONALD RAVEN had 18 patients with involvement of the hypopharynx or cervical esophagus, of whom the majority exhibited advanced carcinoma. Twelve underwent laryngoesophagopharyngectomy, 4 laryngopharyngectomy, and 2 pharyngectomy, with no operative mortality. Twelve lived 1 year or more afterward. The longest survival was 34 months. Conservation of the larynx is not advised. Bilateral block dissection of the neck must be done.

R. G. MACBETH stated that the help of the plastic surgeon was needed and stressed early removal of the plastic tube and also the advisability of a radical neck dissection at the time of the single operation.

GEOFFREY H. WOOLER advocates surgical treatment in one operation. He reports a case of involvement of the pyriform fossa which spread to the entrance of the esophagus. By immobilization of the esophagus down to the aortic arch, it was possible to anastomose it to the pharyngeal mucosa. This patient made a rapid, uninterrupted postoperative recovery.

DAVID MOVITZ, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Therapeutic Trauma of the Brain. P. MacDonald Tow. *Lancet*, Lond., 1952, 2: 253.

In a philosophical treatise on the pros and cons of lobotomy, the author comes to several conclusions. In essence he believes that the original major lobotomy as described by Freeman and Watts should be restricted to very ill psychotic patients. The author points out that very major postoperative personality defects can be expected after this operation. He therefore believes also that small localized frontal lobe ablations, performed in skilled hands and carefully appraised, are indicated in selected patients who are not sick enough to be subjected to the major lobotomy. He points out the importance of assessing the patients on the basis of their social adjustment as well as by the established methods of clinical evaluation. JOSEPH RANSOHOFF, M.D.

Brain Tumors in Childhood. FRANK J. OTENASEK. *Surg. Clin. N. America*, 1952, 32: 1363.

The purpose of this article is to emphasize the fact that intracranial tumors in childhood are not necessarily hopeless, regardless of their apparent preoperative or even operative incurability. Five illustrative case histories are given.

The first case, both by examination and ventriculography, showed evidence of a midline cerebellar lesion, presumably a medulloblastoma; however, a large midline astrocytoma was found and completely removed.

The second child had a medulloblastoma; it was subtotally removed and the child was given x-ray therapy. Three years after the operation the child appeared normal and was attending school.

The third patient, with symptoms and signs of increased intracranial pressure, was found to have an infiltrating astrocytoma of the optic chiasm and nerves. A hopeless prognosis was given. Deep x-ray therapy was administered, and the symptoms of increased intracranial pressure disappeared in a few weeks' time. When seen, 5 years later, vision was very poor bilaterally and there was marked bilateral optic atrophy; however, at that time the child was attending a school for the blind and leading a happy life.

The fourth case (a 5-year survival) was that of a diffusely infiltrative astrocytoma of the brain stem. Operation in this case failed to relieve even the obstruction to cerebrospinal fluid flow through the fourth ventricle.

The last child had a malignant meningioma and died 3 years following surgery and x-ray therapy. This survival apparently helped to preserve the sanity of her mother by allowing another pregnancy to culminate.

The author's plea for a dynamic approach toward all brain tumors in children is well summarized by the 5 case histories which he describes.

DAVID G. FREEMAN, M.D.

The Therapeutic Use of the Radioactive Isotopes in Intracranial Tumors. LOYAL DAVIS and STANTON L. GOLDSTEIN. *Ann. Surg.*, 1952, 136: 381.

This timely article considers the possibilities of the local application of radioactive isotopes in the therapy of gliomas following surgical removal. In a series of well controlled experiments the authors have investigated in cats the radiation effects of high therapeutic doses of radioactive colloidal gold (Au^{198}) and chromic phosphate (P^{32}). The difficulties of using radioactive isotopes systemically for tumor therapy are enumerated:

1. It is necessary to obtain an extremely high tumor to normal tissue affinity ratio (ideally 100 to 1).

2. Although the normal nervous system is extremely resistant to roentgen ray effects, no previous studies have been done to detect the effects of irradiation of the nervous system with radioactive isotopes.

3. The intravenous use of radioactive isotopes for the treatment of general systemic disease (such as leucemia) has not been particularly successful because of the danger of producing an aplastic anemia from bone marrow irradiation.

Other workers have found that the local injection of insoluble radioactive chromic phosphate (P^{32}) and colloidal suspensions of radioactive gold (Au^{198}) when used on experimental animal tumors remained essentially in situ, although small amounts were carried to the local lymphatics. Previously it had been shown that injections of chromic phosphate (P^{32}) in rat and mouse tumors had destructive effects on the lymphatic organs, the bone marrow, the small intestine, the granulosa cells of the ovary, and on mammary tumors. No damages were found in the cerebrum or cerebellum.

Gelfoam and starch sponges impregnated with radioactive colloidal gold (Au^{132}) or chromic phosphate (P^{32}) are envisioned as suitable substances to line gliomatous cavities after tumor removal for irradiation of the remaining tumor cells. The experiments described by the authors are designed to test the effect of beta irradiation on normal brain tissue. Radioactive colloidal gold (Au^{198}) has a half life of 2.8 days. The radiation is 95 per cent beta and 5 per cent gamma. The colloid is suspended in a gelatin solution at a *p*H between 5.5 and 6.5. Particles vary from 100 to 300 mμ in diameter. It is steam-sterilized and shipped as a sterile and pyrogen-free solution. Radioactive chromic phosphate (P^{32}) is a suspension with a particle size less than 1 μ in diameter. The half life is 14.3 days. It is a pure

beta ray emitter, is sterilized by autoclaving, and is kept refrigerated until ready for use. In these experiments the test substances were implanted intracerebrally through a small trephine opening. The animals were sacrificed at intervals of 1, 2, 4, 8, 16, or 32 weeks postoperatively. All brains were removed, fixed in formalin, and sectioned coronally. Histologic sections were made of the operative site and the opposite normal cerebral hemisphere.

Blocks of tissue were also taken from the thyroid, submaxillary gland, cervical lymph gland, lung, liver, spleen, kidney, bone marrow, and gonad. Controls consisted of plain gelfoam or starch sponge, and gelfoam or starch sponge impregnated with nonradioactive colloidal gold or chromic phosphate. In all of the control animals the microscopic studies showed no evidence of any chemical irritation and the cerebral tissue destruction appeared to be due entirely to surgical trauma. In each case there was a central cavity containing gelfoam or starch sponge infiltrated with many closely packed histiocytes which contained particles of chromic phosphate (P^{32}) or colloidal gold (Au^{198}) when used. In all cases there was a rapid transition to normal tissue. No pathologic effects were noted in other parts of the nervous system or other organs of the body. In the experimental animals, gelfoam or starch sponges were impregnated with radioactive colloidal gold (Au^{198}) or chromic phosphate (P^{32}), the size of the gelfoam or starch sponge being sufficient to irradiate 16 sq. mm. of tissue. In the case of radioactive colloidal gold (Au^{198}), the dose was approximately 1 mu per square centimeter, and in the case of radioactive chromic phosphate (P^{32}) the average dose was approximately 90 mμ per square centimeter. Histologically, in the animals sacrificed within a few weeks of surgery there was a band of necrosis around the central operative site which was usually 2 to 3 mm. wide but varied considerably in different areas. However, there was an abrupt transition from necrotic zone to normal zone which indicated a definite and limiting depth of necrotizing irradiation. In the animals sacrificed "after several weeks" the necrotic area was replaced by a glial scar and connective tissue. There were no abnormalities seen in other parts of the central nervous system or other organs of the body. Finally, there were no appreciable differences between the effects of radioactive colloidal gold (Au^{198}) and those of chromic phosphate (P^{32}), although the authors believe the latter substance is easier to handle and presents less danger of irradiation to the surgeon.

Considering the localized effects of these radioactive isotopes and the apparent high resistance of the normal cells of the central nervous system to beta irradiation these studies suggest that this method of local application of radioactive isotopes is well worth investigating clinically in an attempt to irradiate the gliomas. GEORGE M. AUSTIN, M.D.

Diagnosis and Surgical Treatment of Pituitary Tumor. J. GRAFTON LOVE. *Surg. Clin. N. America*, 1952, 32: 1005.

The author reviews the surgical treatment of pituitary tumors. He points out that the two indications for surgery are reduction of vision by direct pressure of the tumor on the optic nerves and chiasm, and the production of increased intracranial pressure by blockage of the anterior third ventricle. The chromophobe adenoma is by far the most common tumor of pituitary origin requiring operation. The two most important diagnostic findings are the characteristic bitemporal hemianopsia and enlargement of the sella turcica in the roentgenogram.

Concerning the operative approach to these tumors, the author prefers a right frontal flap, the operation being carried out extradurally down as far as the sphenoid wing. He believes in removing as much as possible of the body of the tumor along with an extensive resection of the capsule. Postoperative x-ray treatments are restricted to those cases in which an unsatisfactory removal of tumor was carried out or in which the pathological report is one of unusual activity or malignancy.

JOSEPH RANSOHOFF, M.D.

MISCELLANEOUS

Plastic Repair of Congenital Defects Associated with Spina Bifida and Cranium Bifidum. MILTON T. EDGERTON. *Surg. Clin. N. America*, 1952, 32: 1327.

The author has given an excellent review of the background, etiology, pathology, and incidence of spina bifida and cranium bifidum. The question of operability, particularly in relation to hydrocephalus, sphincteric damage, and paralysis is discussed with real optimism. None of these conditions is believed by the author to constitute a contraindication to surgery. He states that the course of the hydrocephalus is not harmed by the operation, and relief of adhesions in the cauda equina may actually cause a reduction in the head size. Sphincteric control and neurologic deficit in the lower extremities may also improve following repair of the defect.

The author finds large transverse double pedicle flaps to be most useful in the immediate closure of large core defects. The availability and ease of application of homogenous bank bone for the repair of skull defects is stressed. The superiority of human tissue over foreign materials in the repair is suggested. A very rare type of encephalocele involving the orbit is described and its repair is shown.

DAVID G. FREEMAN, M.D.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Intrathoracic Tracheal Tumors: Development of Surgical Techniques for Their Removal. O. THERON CLAGETT, HERMAN J. MOERSCH, and JOHN H. GRINDLAY. *Ann. Surg.*, 1952, 136: 520.

Serious pathologic processes of the trachea are uncommon. Yet this organ and organs closely associated with it are exposed to a variety of diseases. It is remarkable that the increased incidence of bronchogenic tumors has not been paralleled by an increase in the incidence of tracheal tumors. Certainly the trachea is exposed to dangers as great as those to which the bronchi are exposed. Because tracheal tumors are rare and because direct surgical attack on them has not seemed feasible, they have received little attention even from endoscopists and thoracic surgeons. Treatment has been limited to endoscopic removal of the intraluminal portion of the tumor, the implantation of radon seeds, and the application of roentgen rays. This treatment has accomplished some palliation but has never been curative of malignant lesions.

It is now apparent that a direct surgical attack can be made on some tracheal tumors. Surgical procedures performed on experimental animals have demonstrated that resection of segments of the trachea is technically feasible. Increasing experience with pulmonary and intrathoracic operations has reduced the danger of surgical intervention on the trachea. The authors have used methods and techniques developed in the experimental laboratory to operate on a small number of patients with tracheal tumors.

Tracheal tumors are found most often in men between 40 and 70 years of age. These tumors usually involve the lateral walls of the lower third of the trachea. The symptoms usually are cough, hemoptysis, dyspnea, and wheezing. Routine thoracic roentgenograms often show no detectable evidence of a tumor. Tomograms frequently are necessary to demonstrate these tumors roentgenographically.

Tracheal tumors are best diagnosed by bronchoscopy. The most common types are squamous cell carcinoma, cylindroma, adenocarcinoma, and hemangioendothelioma. Cylindromas of the trachea tend to grow slowly and to metastasize late and thus are the most favorable type of tracheal tumors for surgical resection.

In the complete article 4 cases of tracheal tumors are reported in which surgical resection of the tumor was performed. Three of the tumors were cylindromas and 1 tumor was a squamous cell carcinoma. One patient died of bronchopneumonia 6 days after operation and 1 died 2 years after operation from local recurrence and extensive pulmonary metastasis. One patient is alive and well 11 months after operation, and 1 is alive and well 1 year after operation.

Resection of the Trachea for Carcinoma. BERT H. COTTON and JOAO R. F. PENIDO. *J. Thorac. Surg.*, 1952, 24: 231.

Two cases of primary carcinoma of the trachea treated by complete circumferential resection are reported. The air passage was reconstructed with a stainless steel tube.

Under intravenous anesthesia, the resection was carried out through a combined cervicosternal splitting incision and a thoracotomy on the right side through the second anterior interspace. Adequate ventilation was supplied by a sterile endotracheal tube introduced into the lower trachea through the wound. The prosthesis was anchored with mattress sutures through holes in the ends of the tube to the tracheal stumps. The tube extended 1 cm. into each segment of the trachea. On 2 occasions the first patient had difficulty because the sutures broke and obstruction of the trachea occurred. This was caused by slipping of the loosened tube. The tube was replaced with complete relief of the symptoms; it was anchored with No. 28 wire, which is recommended as the suture material of choice.

To avoid uncontrolled escape of air during cough, as well as for the control of secretions, an indwelling endotracheal catheter was left in the trachea for 3 or 4 days, after which time this was no longer necessary.

The patients were alive and well 16 and 6 months after operation. The article is well illustrated and a bibliography of 48 references to the literature is appended. HIRAM T. LANGSTON, M.D.

Oxygen Uptake in Human Lungs Without Spontaneous or Artificial Pulmonary Ventilation. HENRIK ENGHOFF, MARTIN H:SON HOLMDAHL, and LARS RISHOLM. *Acta chir. scand.*, 1952, 103: 293.

That life can be maintained without spontaneous or artificial ventilation of the lungs in animals is an accepted experience. Animals rendered apneic can be kept alive for periods of several hours if they are provided with a continuous flow of pure oxygen endotracheally, administered under no increased pressures.

The mechanism by which this consumption of oxygen occurs has been referred to as "oxygen hunger" and the process is called "diffusion respiration." Because of the affinity of hemoglobin for oxygen, the amount of oxygen removed from the alveoli during apnea exceeds the amount of carbon dioxide that simultaneously enters the alveoli from the blood. The pressure within the alveoli is, therefore, reduced to subatmospheric, and a continuous inward movement of the dead air space and of external atmosphere occurs.

Even though, for obvious reasons (limitations of experimentation on human subjects), the present experiments may not have been rigidly conducted,

demonstration of "diffusion respiration" is believed to have been accomplished.

Seven humans about to undergo surgical operations but free of chest disease were endotracheally intubated with a cuffed tube under intravenous narkotal (barbiturate) anesthesia. After 10 minutes' inhalation of pure oxygen, the endotracheal tube was connected to the expiratory hose of a Krogh's spirometer containing pure oxygen, the instrument being so balanced as to provide no positive pressures. Respiratory movements and oxygen uptake were recorded for 5 minutes. Apnea was then produced more or less completely by increments of narkotal and curare. Apnea was allowed to persist for 5 to 7 minutes, when the subjects were reconnected to the anesthesia machine for artificial ventilation. Results were checked, by arterial blood and lung air samples, for oxygen and carbon dioxide immediately before, at the end of, and 5 minutes after, each period of apnea.

On the basis of these experiments (even though perhaps not perfectly conducted from a strictly rigid experimental standpoint) the authors conclude that diffusion respiration does occur in the human. It is therefore possible to get sufficient oxygen uptake for short periods without spontaneous or artificial respiratory movements and without rhythmic changes of pressure in the lungs, provided that the circulation is adequate and that pure oxygen is supplied through a free airway.

The accumulation of carbon dioxide prevents prolongation of the period of apnea beyond a short time, as no method of removing carbon dioxide without pulmonary ventilation is known.

HIRAM T. LANGSTON, M.D.

Bronchiogenic Carcinoma, A Product of Multiple Sites of Origin. EDWARD J. MCGRATH, EDWARD A. GALL, and DALE P. KESSLER. *J. Thorac. Surg.*, 1952, 24: 271.

A large segment of opinion has long held to the principle of the unicellular or unicentric origin of neoplasms. In recent years, a formidable body of evidence has been accumulated, indicating the origin of tumors from multiple sites (the multicentric origin of neoplasms); however, little attention has been directed to this phenomenon in the case of pulmonary neoplasms.

Large tissue sections were prepared from 87 lungs containing bronchiogenic carcinoma. In 5 of these, there were 2 grossly visible primary carcinomas in the same or different lobes. In 25 other specimens there were found, on microscopic examination, plaques of preinvasive or early invasive carcinoma, in close contiguity with the main tumor or at such a distance as to be considered independent lesions. In 53 per cent of the cases, the major presenting tumor contained 2 to 5 different histologic patterns arranged in such a manner as to imply initial independence and ultimate fusion of the neighboring neoplasms. Sixty-three per cent of the specimens exhibited one or more of the features enumerated.

These observations lend weight to the hypothesis that bronchiogenic carcinoma may often arise from more than one site, and clinical recognition frequently does not occur until the coalescence of independent growths has been completed.

SAMUEL KAHN, M.D.

Bronchogenic Carcinoma. HANS F. SMETANA, LALLA IVERSON, and L. L. SWAN. *Mil. Surgeon*, 1952, 111: 335.

The authors have analyzed the autopsy findings in 100 cases of bronchogenic carcinoma, with regard to the clinical and pathological features; they also consider other intrathoracic lesions that enter into the differential diagnosis.

Formerly regarded as being of infrequent occurrence, bronchogenic carcinoma is now considered to be of major importance. Published reports indicate that the stomach is the only organ in which primary carcinoma occurs more frequently than in the lung. Its occurrence in the lungs is attributed to changes in the mode of life of man during the last few decades (industrialization, the general use of motor vehicles on tarred roads, exposure to a variety of pulmonary irritants—smoking, radioactive emanations, and chronic bacterial and virus infections).

Among approximately 2,914 chest tumors observed at the Armed Forces Institute of Pathology, slightly more than 2,488 (85%) were diagnosed as bronchogenic carcinoma. Of 1,882 primary tumors of the stomach, 1,564 (83%) had been diagnosed as primary carcinoma. The incidence in the age group from which this material is selected is higher for primary carcinoma of the lung than for primary carcinoma of the stomach.

Analysis of pertinent data from the literature reveals that a wide variety of occupations may be represented among individuals with bronchogenic carcinoma. Likewise, the age range is extremely wide. The incidence is highest between the ages of 50 to 60, with the peak close to 55 years.

The symptoms most commonly encountered, in order of frequency, are as follows: cough, thoracic pain, sputum, dyspnea, hemoptysis, loss of weight, weakness, dysphagia, and hoarseness. In a high percentage of cases no chest symptoms whatever were reported. The suspicion of lung tumor usually leads to a series of clinical and laboratory studies, such as x-ray and planographic films, bronchoscopic and sputum studies, thoracentesis, lung puncture or thoracic biopsy, to confirm the diagnosis and determine the type of tumor present. Histologic studies of aspirated material appear to offer a means of early diagnosis of lung tumors.

In addition to bronchial adenoma, chondroma, neurofibroma, hamartoma, and cysts of the lungs, pleura, and pericardium, other lesions such as tuberculosis, pneumoconiosis, fungus infection, chronic pneumonia, and metastatic tumors of the lungs must be considered in the differential diagnosis.

In the majority of cases it is possible to recognize well defined histologic types of lung cancer; and

despite the probability that all bronchogenic cancers may spring from the same kind of primitive cell, the tendency to differentiate into specific histologic types may determine the biologic behavior of the tumor. Three types of primary carcinoma of the lung can be distinguished: squamous carcinoma, undifferentiated cell carcinoma, and adenocarcinoma. A fourth type which is sometimes considered separately is the pleomorphic cell carcinoma.

The 100 cases of bronchogenic carcinoma were selected at random from the autopsy files of the Armed Forces Institute of Pathology. These included 42 undifferentiated cell cancers, 35 squamous cell, 22 adenocarcinomas, and 1 pleomorphic cell type of cancer.

Bronchogenic carcinoma is the most frequently observed neoplasm of the lung and slightly exceeds the total number of cases of carcinoma of the stomach on file at the Armed Forces Institute of Pathology.

The average age was 44 years, considerably lower than the generally accepted figure of about 55 years, probably due to the greater percentage of younger men in the Army. The overwhelming predominance of males in this series is ascribed to unequal distribution of the sexes in the Army service.

The clinical symptoms produced by the various bronchogenic tumors were, in general, much the same. The average duration of slightly more than 6 months from the time symptoms were reported to the time of death agreed with durations reported in most surveys. The duration of illness in patients with pleomorphic cell cancer was significantly longer than in those with other types of bronchogenic cancer.

Metastasis was found in 94 of the 100 patients; the sites most frequently involved were the lymph nodes, the lungs, and the liver. Metastatic lesions were found at autopsy in 31, or 89 per cent, of the 35 patients with squamous cell carcinoma, indicating little difference in the frequency of metastasis compared with other cell types.

It is important not only to distinguish between the major types of bronchogenic cancers, but also to recognize the clinical and pathologic features which differentiate them from a number of other thoracic lesions. The more significant of these are alveolar cell carcinoma, bronchial adenoma, primary tumor of the pleura, and tumors of the mediastinum. The Pancoast tumor, now known to be a syndrome rather than an entity, is included in the descriptions given. The behavior of the 3 main histologic types was compared and 8 additional cases of pleomorphic cell cancers were selected for comparison with the bronchogenic types. JOHN H. MOHARDT, M.D.

HEART AND PERICARDIUM

Primary Tumor of the Heart. NATHANIEL H. SCHWARTZ and MARGARET LODER. *N. York State J. M.*, 1952, 52: 2658.

The rarity of primary tumors of the heart prompted the authors to report the case of a 39 year old colored male with an angiosarcoma arising in the myocardium and metastasizing to the lungs.

The patient's initial admission to the hospital, 2 years prior to death, was characterized by physical and laboratory findings of pericarditis and effusion of unknown etiology. The pericardial fluid diminished rapidly and aspiration was not carried out. Clinical improvement permitted the patient's discharge on the twenty-fifth day.

At the time of the second admission, following a comparatively symptom-free interval of 19 months, the patient appeared to be more acutely ill than he had been before. He presented much the same abnormal cardiac findings but, in addition, roentgenography now disclosed evidence of pulmonary metastases. Thoracentesis yielded straw-colored fluid from the left pleural cavity and frank bloody fluid from the pericardial cavity. Cytologic and bacteriologic studies failed to reveal the presence of organisms or cellular elements other than red blood cells. It was presumed that both the pericardium and the lungs had been invaded by a neoplastic process derived from an occult primary source elsewhere. Improvement was slow but the patient was able to leave the hospital on the thirty-sixth day.

Approximately 4 weeks later, he became severely distressed again and was readmitted in a deteriorated condition for the third and last time. The positive specific findings were even more exaggerated, but still were limited to the heart and lung fields. He ran an unabated, progressive downhill course and expired suddenly after a few days.

Post-mortem examination disclosed the presence of an extensive primary angiosarcoma of the heart. From its point of origin in the myocardium of the right auricle the neoplasm had metastasized throughout both lung fields.

It has been stated, roughly, that not more than 5.0 per cent of all cardiac tumors arise in the heart, usually in the wall of the right auricle or ventricle. The diagnosis of a cardiac tumor is seldom entertained clinically and then only when manifestations of an otherwise unexplainable cardiac dysfunction appear in the presence of a known neoplastic process. Metastatic cardiac tumors tend to arouse suspicion more often than do neoplasms which originate in the heart, mainly because the primary growth is easier to detect and to follow when located beyond the confines of the heart. Moreover, the primary tumor is usually encountered before evidence of cardiac disturbance appears. Primary cardiac tumors often tend to remain asymptomatic. Hemopericardium, fixation of the heart, localized enlargements of the cardiac silhouette, and recovery of tumor cells by pericardial aspiration serve as important diagnostic clues.

While the authors failed to identify the correct site of the primary neoplasm in the case here presented, they concede that a careful analysis of the symptoms and sequence of events should have suggested the presence of a primary tumor of the heart. They point out that the development of hemoperi-

cardium in an otherwise healthy young adult followed by the dissemination of characteristic metastatic pulmonary lesions should have focused their attention on the right heart, particularly since intensive studies failed to reveal the existence of a malignant process elsewhere. DAVID H. LYNN, M.D.

The Surgical Treatment of Pulmonary Stenosis (Valvulotomy). F. A. P. VAN BUCHEM, L. D. EERLAND, J. NIEVEEN, B. P. A. A. HOMAN, and W. E. MARRING. *Acta med. scand.*, 1952, 143: 415.

The authors survey the development of operations for the relief of pulmonary stenosis and discuss chiefly (1) the advantages and disadvantages of the Blalock operation for the tetralogy of Fallot as contrasted to the Potts operation, and (2) the rediscovery and development (by Brock) of an operation by means of which, in cases of tetralogy of Fallot, much improvement can be obtained by valvulotomy of the pulmonary stenosis. The method of Varco, in pursuing the relief of valvular pulmonary stenosis by clamping the venae cavae, opening the pulmonary artery, and cutting into the stenosis under direct vision is also discussed.

For purposes of discussion, the article is divided into three parts. The authors first consider "pure" pulmonary stenosis. This defect, in which the three pulmonary valves have fused and form a portio-like aspect, is now thought to be a more frequent defect than was originally assumed. The authors report that by systematic examination they have found, during the last 2 years, 10 cases of pure pulmonary stenosis. The difficulties and uncertainties of the diagnosis of pure pulmonary stenosis are discussed.

The site of stenosis is discussed in the following groups: (1) stenosis of the valves of the pulmonary artery, (2) infundibular stenosis situated in the pulmonary conus of the right ventricle central to the valves of the pulmonary artery, and (3) a combination of a valvular and an infundibular stenosis.

In discussing the suitability for operation of this class of cases, the authors state that in the less severe cases, i.e., patients whose pressure in the right ventricle is not very high and who have for the most part no symptoms, operation is not advisable. In those patients who complain of dyspnea on effort and who are incapable of moderate exercise, the operation is very necessary. In this latter type of case the pressure in the right ventricle is very high.

Under the heading of tetralogy of Fallot, cases of slight dextroposition of the aorta are considered suitable for valvulotomy. A Blalock-Taussig operation is not applicable here. Infundibular stenosis with the tetralogy of Fallot is discussed and described. The pulmonary artery usually has but two valves and the zone of stenosis is generally situated below these. This zone of stenosis is the so-called subpulmonary channel of the right ventricle. A part of the diaphragm which partitions off this sometimes large ventricle from the right ventricle itself, is punched away with Brock's punching apparatus, by means of which the stenosis can be removed.

Pulmonary stenosis with interatrial septal defects is discussed. In typical cases of slight pulmonary stenosis and only slightly elevated pressure in the right ventricle there is a shunt from the left to the right auricle so that on catheterization a considerably higher oxygen saturation in the right as contrasted to the saturation in the superior vena cava is found. These patients will not often have many symptoms, and operations will not be considered. The physiology and the symptomatology of this type of stenosis are discussed.

In the operative technique the authors use a curved anterolateral incision or a submammary incision with subperiosteal resection of the fifth or fourth rib together with its costal catilage, when valvulotomy is performed. In the cases of tetralogy of Fallot in which it is not certain before the operation whether valvulotomy is to be performed, the patient is placed in a lateral position and the operation is started with a lateral incision. In the event valvulotomy is done the thoracic incision is made longer anterolaterally, or in a shunt operation the incision is extended posterolaterally.

If valvulotomy is to be performed, 20 to 30 ml. of 2 per cent procaine solution is injected into the pericardium; the pericardium opened after 5 minutes with a door-wing incision. The incision of the cardiotomy is in the direction of the cardiac axis running along the length of the fibers. In the dissection, the last millimeter is perforated by a sound, the valvulotome is inserted, and the stenosis split. The opening is stretched with round perforated dilators so that the flow of blood to the lungs is not interrupted. The dilatation of the valve is concluded with the specially constructed dilating instrument of Brock. If the stenosis lies very low and the infundibular ventricle is large, Brock advises attacking the stenosis from above through this third ventricle.

A continuous electrocardiogram is used to recognize the threat of coronary insufficiency.

In regard to operative risk, the authors state that among 9 cases a very satisfactory result was obtained in 8 cases. Only 1 patient has died; in this case the prognosis was bad in view of severe cardiac dilatation. In one patient cardiac arrest of short duration only occurred. Results of this operation thus far may be called favorable although possible recurrences of the stenosis may eventually occur. According to the results reported by Brock and Campbell, who have conducted longer follow-up studies, the favorable situation has been shown to persist.

F. FOSTER MONTGOMERY, M.D.

ESOPHAGUS AND MEDIASTINUM

Congenital Atresia of the Esophagus (L'atrésie congénitale de l'oesophage). M. J. DABADIE. *Bordeaux chir.*, 1952, 2: 57.

According to statistics, 1 of every 2,500 newborn infants has a congenital atresia of the esophagus. Within a period of 5 years the author observed this condition 15 times among 16,500 newborn infants.

The preoperative treatment consists of repeated aspirations of the mucus through a rubber catheter, and placing the patient in an oxygen tent.

While the right posterior retropleural approach with resection of the second to fifth ribs is the most popular method, the author recommends resection of 6 cm. length segments of the fourth and the fifth ribs only. He employs Blalock's everting sutures in 2 layers. Fluids are administered intravenously during the operation and for the next 48 hours. Premature infants are kept in an incubator after the operation.

JOSEPH K. NARAT, M.D.

The Surgical Management of Congenital Atresia of the Esophagus and Tracheoesophageal Fistula. N. LOGAN LEVEN, RICHARD L. VARCO, BERNARD G. LANNIN, and LYLE A. TONGEN. *Ann. Surg.*, 1952, 136: 701.

This article represents a detailed study of the surgical management of congenital atresia of the esophagus and tracheoesophageal fistula. A series of 103 cases seen at the University of Minnesota Hospitals and the Childrens Hospital in St. Paul since 1939 are reviewed.

Many authors have previously reviewed the literature and collected recorded cases. The earliest recorded instance of esophageal deformity appears to be that related by Durston, in 1670. The number of cases reported indicates that the anomaly is not rare.

In this series there were 63 male and 40 female infants. Genetic factors are cited as the causes of the condition in some cases. The embryology is described and no one embryologic explanation of esophageal anomalies will account for all types seen. Accordingly, these anomalies are divided into three main groups. In type I there is a complete absence of the esophagus, an extremely rare condition. In type 2 there is a blind end to both the upper and the lower segments; this is also a rare type. Type 3 includes the anomalies with tracheoesophageal communications. In type 3a the upper segment communicates with the trachea and the lower segment has a blind proximal end; this is another rare type. In type 3b the upper segment is blind and the lower segment communicates with the trachea at or about the level of the bifurcation of the trachea. This is the common type of congenital anomaly of the esophagus. In type 3c both the upper and the lower segments communicate with the trachea (rare type).

There were 7 cases of simple atresia of the esophagus (type 2). The obstruction in cases of simple atresia may vary from a membranous diaphragm to complete agenesis. The lower segment of the esophagus in these 7 cases ended blindly just above the diaphragm and the upper segment appeared as the usual hypertrophic blind pouch. The common type of atresia of the esophagus with tracheoesophageal fistula (type 3) occurred in 93 cases. In 2 cases the upper and the lower segments of the esophagus communicated with the trachea (type 3).

Associated multiple anomalies are common and complicate the management, often contributing to unsuccessful results. In this series there were 17 cases with other major anomalies, 12 of which could have been considered a factor in the unfavorable result of treatment. Intracranial hemorrhage was present in 3 cases.

It is noted that increased amounts of mucus fill the mouth and pharynx and drool from the sides of the mouth, which suggests that the anomaly is present at birth. Severe choking spells occur after a few swallows when the infant is fed and are regurgitated through the mouth and nose. Spells of cyanosis recur because of the aspiration of mucus. Loss of weight due to starvation is evident; the infants develop aspiration pneumonia and die if not given the chance of survival now offered by surgery.

Confirmation of the diagnosis is obtained by the passage of a small urethral catheter which meets obstruction at 10 to 12 cm. from the anterior alveolar margins. The upper blind pouch can be visualized by instilling a small amount of lipiodol under the fluoroscope, which should be removed. The same information may be obtained by esophagoscopic examination and determined by the presence or absence of air in the stomach.

The common type of atresia of the esophagus presents three problems: (1) feeding, (2) prevention of regurgitation of the gastric contents into the lungs through the tracheoesophageal fistula, and (3) prevention of the aspiration of saliva or liquids. Surgical treatment of these cases has been directed to one or more of these problems. Gastrostomy, jejunostomy, ligation and transection at the cardiac end of the stomach or esophagus, exteriorization procedures, and abdominal esophagostomy have been tried and found wanting. Several methods of direct attack on the fistula are described in detail.

Earlier diagnosis of congenital atresia of the esophagus and tracheoesophageal fistula has permitted surgical correction of this anomaly in more cases in recent years. More careful preoperative preparation and postoperative care, along with improvement in technique, have resulted in a reduced mortality. In the patients in whom a multiple stage operation had been performed, the re-establishment of continuity of the alimentary tract presented such a problem that it is believed the indications for primary anastomosis should be extended to include all but a few cases.

Of the 103 patients in this series, 23 had multiple stage operations and 13 are living. In 68 patients a primary anastomosis of the esophagus was performed; of these, 43 are living. Some of the problems and complications encountered in the treatment are discussed.

J. H. MOHARDT, M.D.

Esophagobronchial Fistulas in the Adult as a Complication of Traction Diverticula of the Esophagus (Fistules oesophago-bronchiques chez l'adulte avec diverticule oesophagien de traction). M. JAUBERT DE BEAUJEU. *Lyon chir.*, 1952, 47: 796.

The author presents a series of 8 cases of tracheobronchial fistulas in the adult patient as a complica-

tion of traction diverticulum of the esophagus. The diverticula were located mainly in the midportion of the esophagus and the largest ones measured 3 cm. in diameter. Localized abscesses about the site of the fistulas were, of course, common and in several instances were demonstrable by lipiodol studies of the tracheobronchial tree. In most instances bronchoscopic examination failed to demonstrate the abnormal opening and showed only an inflamed tracheobronchial tree. Lipiodol studies sufficed in most instances to demonstrate the abnormal communication.

In most instances, resection of the area and suture of both components of the fistulas was attempted. Three operative deaths occurred in the series. In 2 cases a severe empyema resulted and in 1 patient death resulted from this complication. In view of the severe prognosis associated with the treatment of such conditions, the author suggests that early treatment of chronic pulmonary suppuration is mandatory. It is difficult, however, to justify the rather large mortality associated with this present series in view of the success that is being obtained in the treatment of such conditions on the American continent at this time. ORVILLE F. GRIMES, M.D.

The Attempt to Establish Early Prognosis of Epitheliomas of the Esophagus (Essai d'appréciation précoce du pronostic des épithéliomas de l'oesophage). GEORGE BRULÉ, REMI GÉRARD-MARCHANT, and JEAN R. SCHLUMBERGER. *Presse méd.*, 1952, 60: 1357.

The same team of clinicians, roentgenologists, and pathologists examined 206 patients with cancer of the esophagus.

In one group of 144 patients, 142 were smoking more than 20 cigarettes daily.

Dysphagia has diagnostic, but no prognostic value. Likewise, advanced metastases may be found in patients who have not lost any weight. On the other hand, roentgenologic studies are of great prognostic value. They should be supplemented by esophagoscopy because negative x-ray findings do not exclude the presence of a malignant tumor.

The authors have never observed leucoplakia, which, according to a classical statement, precedes cancer in 70 per cent of the cases. The prognosis is better in patients in whom the mucosa surrounding the tumor has a normal aspect than in those in whom the mucosa is fragile, infiltrated, and bleeds easily.

Bronchoscopy is indispensable for the study of tumors located above the bifurcation of the trachea as it allows an appraisal of the extent of the tumor. Visual exploration may advantageously be supplemented by tactile sensation obtained by means of a probe introduced through the esophagoscope. Negative esophagoscopic findings do not exclude the presence of a tumor and consequently are of no value for the prognosis.

Histopathologic studies, with special attention to keratinization, density of cells, and their differentiation were not able to furnish the authors data valuable for prognosis.

Determination of the origin of epithelioma, be it in the mucosa or in the glandular tissue, is without prognostic value. Benign lesions of the esophageal mucosa are great rarities and should be viewed with suspicion.

Late results of x-ray therapy and surgical treatment of carcinoma of the esophagus are about equal.

JOSEPH K. NARAT, M.D.

The Surgical Treatment of Carcinoma of the Hypopharynx, Larynx, and Upper Esophagus. ORVILLE F. GRIMES and H. BRODIE STEPHENS. *J. Thorac. Surg.*, 1952, 24: 246.

According to the authors, carcinomas of the hypopharynx, larynx, and upper esophagus more closely resemble the intraoral group of tumors than the gastrointestinal malignancies of glandular origin and they are more apt to remain localized longer than the latter group. Seventeen patients have been treated in a 3 year period.

The procedure popularized by Wookey was applied and in the majority of the patients treatment was extended to include a unilateral radical neck dissection. The operation is designed to provide a wide en bloc excision of all malignant tissue. Details of the technical steps are elaborated upon in the text.

Twelve of the 17 patients operated upon are alive from 1 to 36 months after the operation. Three patients have small fistulas; however, they experience no difficulty in swallowing. There were 2 operative deaths at 14 and 54 days which were caused by hemorrhage and empyema or respiratory distress. Three other patients died in 12 to 26 months because of recurrence or dissemination of the growth. Cervical lymph node metastases were present in 14 of the 17 patients.

On the basis of their experience, the authors recommend continued efforts at improving the management of malignancies in this area. As technical improvements continue and these interventions are applied to more favorable lesions, the end results can be expected to improve.

HIRAM T. LANGSTON, M.D.

Carcinoma of the Esophagus. A Consideration of Curative and Palliative Procedures. MARK M. RAVITCH, HENRY T. BAHNSON, and THOMAS N. P. JOHNS. *J. Thorac. Surg.*, 1952. 24: 256.

The authors review very objectively the available end results obtained by operative treatment of esophageal carcinoma and find them very disappointing. At the Johns Hopkins Hospital, Baltimore, Maryland, there have been no 5 year cures.

This is to be explained by several factors: (1) the lesion is rarely brought to light early because the symptoms are deceptive and insidious, and (2) the more advanced lesions are disappointing because adequate en bloc resection is limited by the anatomical disposition of the organ in among vital structures, and because of the tendency toward metastases up and down, and wide dissemination even early.

Thus, it seems justified to develop acceptable methods of bringing palliation to this group of patients. Ability to take food by mouth is an important factor in this approach.

In manifestly incurable tumors swallowing may be restored by irradiation or by a shunting procedure, preferably antethoracic esophagoplasty. In cancer of the lower fourth of the esophagus, resection and esophagogastrostomy is the treatment of choice for resectable lesions, and an intrathoracic shunt with a Roux-Y jejunal loop is the treatment of choice for inoperable lesions. In the middle part of the esophagus three operative procedures are available for resectable tumors, each with its own advantages.

1. Resection and esophagogastrostomy, which establishes immediate and direct continuity of the alimentary canal.

2. Resection and antethoracic esophagoplasty which is suitable for patients able to tolerate a Torek procedure but who would not be likely to survive the additional strain of mobilization of the stomach and the interference with pulmonary function caused by placing the stomach in the chest.

The suggested procedure provides the following advantages:

a. There is no tendency to compromise in the amount of esophagus resected and whatever virtue resides in resection is reserved to the patient.

b. The major intrathoracic procedure is short and relatively simple.

c. The anastomosis is extrathoracic and a relatively innocent procedure as far as risk to the patient or effect upon his general condition is concerned.

3. Resection and plastic tube reconstruction provides the quickest and easiest method of esophageal reconstruction and simplifies the operative attack on esophageal cancer. Details of its use are given.

This article provides a concise review of the presently available approaches to management of carcinoma of the esophagus, with emphasis on the essentially discouraging end results from the standpoint of cure rates. HIRAM T. LANGSTON, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Mesenteric Chylous Cysts—Associated Diagnostic and Surgical Problems. ANTHONY J. MENDILLO, ROBERT M. LOWMAN, LEVIN L. WATERS, and HOWARD W. STANLEY. *J. Internat. Coll. Surgeons*, 1952, 18: 265.

Eight of 11 mesenteric cystic masses seen were chylous mesenteric cysts. The remaining 3 were mesenteric cysts.

Chylous mesenteric cysts may arise from various sources. Although they may be preformed and of congential origin, they may also follow trauma and infections of the peritoneal cavity. Although an increasing incidence of malignancy in these cysts is reported, no neoplastic changes were found in this group of cases.

No age or sex predilection for chylous cysts could be determined. They are located in the mesenteric attachments, from the duodenum to the rectum. The importance of preoperative x-ray studies is stressed to exclude the gastrointestinal and urinary tracts as the site of origin of the mass, and to determine its abdominal position. In many cases roentgen studies aid in determining the size and extent of the mass by the "indentation phenomena" produced.

The surgical handling of these cystic masses is best decided after laparotomy. Excision of the mass, despite the extreme variation in the size of the cyst, with resection of the bowel when the blood supply to the intestine was impaired was successfully done in all the operative cases. Marsupialization may be used when necessary.

Improved surgical techniques, the use of chemotherapy and antibiotics, and the maintenance of protein and acid-base balances greatly aid in reducing the mortality rate. Although there are no pathognomonic signs or symptoms of chylous cysts, the possibility of their presence should be considered in the differential diagnosis of abdominal tumors.

The cysts may remain small and asymptomatic or they may produce symptoms as a result of traction, compression, or torsion with impairment of the intestinal blood supply. Acute intestinal obstruction may develop. Hemorrhage or rupture of the cystic mass sometimes occurs. Most frequently the presenting symptoms are those of an acute surgical complication resembling intestinal obstruction. Commonly, the symptoms are those produced by pressure on the organs adjacent to the cyst.

Although a mesenteric cyst per se has little pathologic significance, it may present serious surgical problems and must be differentiated from a large number of malignant lesions. Since one-third of all palpable abdominal masses are malignant, it is essential that all such masses be viewed with much seriousness until an accurate differential diagnosis is made.

SAMUEL KAHN, M.D.

GASTROINTESTINAL TRACT

Acute Profuse Gastric Hemorrhage Without Roentgenologic or Palpatory Findings (Die akute profuse Magenblutung ohne roentgenologisch oder palpatorisch fassbaren Befund). P. C. ALNOR. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 241.

The question of whether an acute major gastric hemorrhage should be treated internally or surgically has been discussed for many years. The classical school of Leube and von Mikulicz taught that surgery is indicated in repeated hemorrhages, but should never be performed in a first bleeding. This dogma no longer holds true. Finsterer, in Vienna, was the first to advocate prompt resection in every profuse bleeding, and to show that surgery ensures a lower mortality rate than management by conservative treatment.

The author describes the management of acute gastric hemorrhage as it has been established at the Surgical Department of the University of Kiel, Germany. The patient is first treated conservatively with morphine, the local application of ice, and a small blood transfusion. However, as soon as signs of a renewed hemorrhage appear laparotomy and resection of the stomach are performed promptly. Before the intervention an x-ray examination is done to rule out bleeding from esophageal varices.

In contrast to the principles laid down by Finsterer, the resection is performed even when neither the x-ray films of the stomach nor inspection and palpation after gastrotomy reveal the source of the hemorrhage.

During the last year the author observed 6 patients with uncontrollable hemorrhage and negative roentgenologic and palpatory findings, 4 of whom were saved by the operation. The cases are described in detail. In 3 of them the hemorrhage was caused by gastritis, in the 3 others by an extremely small ulcer which macroscopically had the appearance of an erosion but had eroded an artery in the muscularis mucosae. The author emphasizes that even a minimal ulcus simplex that does not go beyond the submucosa and cannot possibly be found by palpation may cause a fatal hemorrhage.

Other causes of gastric hemorrhage without palpatory or roentgenologic findings include congestion in pyloric stenosis, arteriosclerosis, Osler's disease, and idiopathic parenchymatous hemorrhage.

WERNER M. SOLMITZ, M.D.

Submucous Lipoma of the Stomach (Lipoma submucoso del estomago). MARTÍN MIQUEO NARANCIO and JUAN MEDOC. *Bol. Soc. cir. Uruguay*, 1951, 22: 439.

Benign gastric tumors are no longer considered a rarity. The incidence of such lesions as compared

to the frequency of malignant tumors, however, remains rather low, and all authors agree to consider gastric lipomas as exceptional.

The authors discuss the only case of submucous lipoma ever published in Uruguay. They give a detailed analysis of all the important clinical as well as laboratory findings and review the literature.

The patient was a 58 year old woman who gave a long history of dyspepsia and epigastric discomfort, which symptoms, however, were atypical enough as to exclude the possibility of peptic ulcer. A short time prior to her admission to the hospital she presented fever, general malaise, and lumbar pain, and was treated with penicillin and sulfanilamide. At the same time she took a dose of a strong cathartic. The intake of this medication was followed a few days later by an episode of massive gastrointestinal bleeding which rendered hospitalization necessary.

The initial physical examination was entirely negative and the only positive laboratory finding was that of a rather severe degree of secondary anemia. The patient was discharged after correction of her blood loss and readmitted a few weeks later for further investigation, at which time roentgenologic examination of her upper gastrointestinal tract revealed the presence of a constant, circular filling defect in the lower portion of the stomach. The edges of the lesion were not rigid and there was a questionable central ulceration. The roentgenologic diagnosis was that of benign gastric tumor, which was confirmed during surgery when a well circumscribed, egg-sized, somewhat ulcerated and pedunculated tumor could be excised. Histologically, it was a submucous lipoma with central ulceration. The postoperative course was uneventful and the patient was discharged in perfect condition.

The author describes the main symptomatology of such lesions. Submucous lipomas which are located at a certain distance from the cardia or pylorus usually remain asymptomatic unless they present ulceration. As in this case, sudden and massive gastric hemorrhage is one of the main symptoms but in the majority of the cases it is never so severe as to endanger life.

The roentgenologic diagnosis is established on the bases of a well circumscribed filling defect, a normal mucosal pattern except in the immediate vicinity of the tumor, and normal peristalsis. In the presence of an ulceration there are, however, no typical findings.

The treatment is surgical. Whether a subtotal gastrectomy or a local excision of the tumor be performed remains up to the judgment of the surgeon after evaluation of the local pathologic findings.

R. SCHOBINGER VON SCHOWINGEN, M.D.

Carcinoma of the Stomach: Review of 406 Cases Seen from 1940 to 1945: Operability, Resectability, and Curability. CHARLES H. BROWN and CHARLES F. KANE. *Gastroenterology*, 1952, 22: 64.

The authors, who are internists, have tabulated 406 cases of carcinoma of the stomach that had been seen at the Cleveland Clinic from 1940 to 1945. Follow-up studies were made in 78 per cent of the group; the remaining 22 per cent are presumed dead. The authors are concerned with the operability, resectability, and curability of gastric carcinoma.

The resectability in the entire group was only 25 per cent of the series. Palliative surgery was performed in 48 patients, or 12 per cent. Exploration only was done in 87 patients, or 21 per cent. Forty-four patients were advised to have surgery but refused. The number of patients considered operable totaled 68 per cent. Of the 235 patients operated on, 43 per cent had resections.

In the entire series there were 29 5-year survivals. Two of the patients survived for more than 5 years without any surgery. Of the remaining 27 patients, all of whom had had gastric resections, 23 are well today. The remaining 4 died; 1 died 5 years after surgery from a cerebrovascular accident and presented evidence of recurrence of the carcinoma at that time. The other 3 died 5, 6, and 7 years, respectively, after gastric resection with extension of the disease. The survival for 5 to 7 years after surgery with death following an extension of the original disease, certainly indicates that 5 year survival does not mean 5 year "cure."

The average for the 5 year survival group is now 90 months. The second longest survival period, 25 months, was found in the group with gastric resection without 5 year cure. Even though gastric resection may not result in a 5 year cure, it would appear that the operation may prolong life. Palliative surgery seemed to offer little to the patients. The survival period of those refusing operation was the longest with the exception of that of the resected group; some of the patients refusing surgery might have had 5 year survivals.

From 1940 to 1945 there were 8 total gastric resections, and 7 complicated resections were attempted when the disease had extended to other organs. Among the 5 year survivals were 3 patients who had extension of the carcinoma beyond the stomach to neighboring organs. These patients demonstrate that extension of the disease to neighboring organs does not necessarily mean that the condition is nonresectable and noncurable, and they show that an extensive operation may result in a cure.

The clinical and pathologic features in the 100 resected cases were analyzed and the 5 year survival group was compared with the group in which the patients died, to determine what factors might give a favorable prognosis. The duration of symptoms had little effect on survival. The type of symptoms the patients experienced showed no essential difference between the 5 year survival group and those who died following resection. A mass was palpable in 6 of the 5 year survivors, but none had a Blumer's shelf or a nodular liver.

The average size of the lesion was actually greater (6.2 cm.) in the survival group than in the fatalities (5.5 cm.). This shows that the size of the lesion does not necessarily indicate a bad prognosis.

The polypoid lesion was by far the most favorable. The polypoid lesions were true carcinomas with invasion of the basement membrane; they were not benign polyps. The patients with small ulcerating carcinomas had only a 17 per cent chance of survival. The prognosis in the grossly infiltrating lesions was the poorest, the percentage of survival being only 13.

Extension into neighboring lymph nodes is usually regarded as an unfavorable prognostic sign. However, 41 per cent of the survival group had extension into the neighboring lymph nodes. Of the group of fatalities, 63 per cent had lymphatic involvement. In the survival group 22 per cent had extension of the disease to the neighboring organs. Of the group of fatalities, 36 per cent had extension.

Lymphatic involvement and extension of the disease to neighboring organs were greater in the group of patients who died than in the group that survived. However, a sufficient number of the survival group did have lymphatic involvement or extension of the disease so that these two findings can be of little prognostic value in any individual case. The fact that such a high percentage of the patients who survived had extension of the disease to the lymph nodes or neighboring organs suggests the possibility that more extensive surgery with more radical removal of the lymphatics might result in a larger percentage of cures.

Palliative surgery was done in 48 patients and consisted of a gastroenterostomy in 43, gastrostomy in 3, and a loop colostomy and closure of a perforation in 1 each. The average length of life following palliative surgery was 7.2 months. Eight patients survived longer than 1 year, and 2 longer than 2 years, which suggested that perhaps some of these patients could have had resections.

Exploration only was done in 87 patients, and the patients were deemed nonresectable at the operating table.

The authors believe it might have been possible to perform a complicated resection on some of the patients with extension of the disease to other organs, and on some of the patients with lymph node involvement. The average survival in this group following exploration was only 2.9 months. However, 8 survived for more than 2 years, and it would seem possible that life might have been prolonged by extensive resection.

The authors also believe that 71 of the 127 patients considered inoperable might have been subjected to surgery with at least a chance of 5 year survival in a few. Certainly, without gastric resection their future outlook was hopeless. The average survival was 4.2 months. However, 5 patients survived more than 2 years.

In summary, of 406 patients with gastric carcinoma seen at the Cleveland Clinic from 1940 to 1945, 68 per cent were considered operable. In this group 100 (25%) were subjected to resection, 48 (12%) to palliative procedures, 87 (21%) were explored only, 44 (11%) refused surgery, and 127 (32%) were considered inoperable.

Of the patients subjected to gastric resection, those that survived 5 years are compared with those that did not. There was no significant difference in the duration of symptoms or the type of symptoms present. The size of the lesion was of no prognostic value. The most favorable type of gross lesion was the polypoid and the polypoid ulcerating lesion, the survivals amounting to 58 per cent and 57 per cent, respectively. Forty-one per cent of the 5 year survivors had lymph node involvement, and 22 per cent had extension of the carcinoma into the neighboring organs. ROBERT TURELL, M.D.

Colon Transposition in Total Gastrectomy. ROLF CARLESON and YNGVE EDLUND. *Acta chir. scand.*, 1952, 103: 249.

The unsatisfactory condition of the life of the totally gastrectomized patient is reviewed and the experience of several surgeons with the substitution of the proximal colon for a gastric reservoir is described.

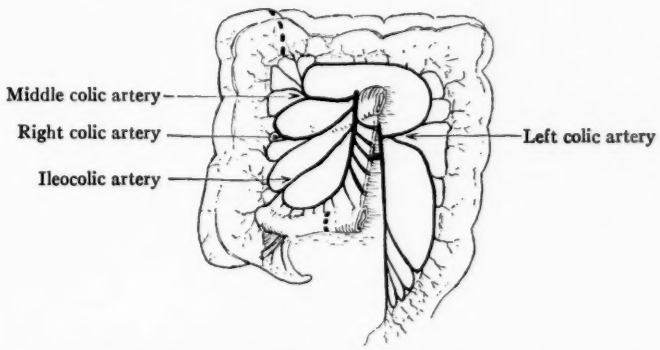

Fig. 1 (Carleson, Edlund). Blood supply to the terminal ileum and large bowel. The dotted lines indicate the sites of resection.

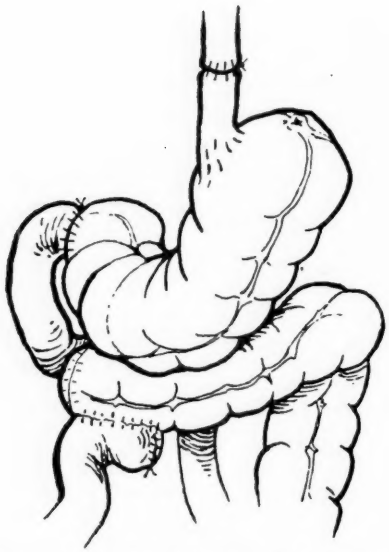

Fig. 2 (Carleson, Edlund). Drawing showing the new gastric reservoir after transposition.

The authors used a modification of the method described by C. F. Lee in 3 cases. Figures 1 and 2 illustrate their method.

The technique involves a midline incision in the epigastrium, radical total gastrectomy, excision of the greater and lesser omenta, the spleen, terminal esophagus, first portion of the duodenum, and the regional lymph nodes. Mobilization of the ileocecal region and appendectomy is necessary. The ileum is divided 10 to 15 cm. from the cecum and the mesentery is divided distal to the hepatic flexure but proximal to the middle colic artery. The distal stump of the colon is closed, and the mobilized segment is turned up into the site of the stomach with a rotation of 90 to 180 degrees. End-to-end esophagoileostomy, end-to-end coloduodenostomy and side-to-side ileotransversostomy are performed.

Three case reports are given. In 1 the patient recovered and did well until he died after 6 months from intestinal obstruction. This was caused by adhesions resulting from a perforation of the small bowel below the coloduodenostomy and from an intraperitoneal tuberculosis. The 2 other patients died some days following the operation, one from cardiac insufficiency and the other because of paralytic ileus.

The authors consider the operation of value but stress the fact that candidates for this procedure must be in good physical condition, particularly from a cardiovascular standpoint, there must be no intercurrent disease, and the cancer must be completely extirpated. The authors also cite the danger that the poor emptying time of the transposed colon may cause dilatation of the colon.

ERNEST D. BLOOMENTHAL, M.D.

Maydl Jejunostomy. E. S. BRINTNALL, KATE DAUM, and N. A. WOMACK. *Arch. Surg.*, 1952, 65: 367.

The authors consider the indications, technique, and clinicometabolic aspects of jejunostomy. In the group of cases here presented, the procedure was utilized for the relief of obstruction, pain, or persistent fistulas. It was believed that the Maydl jejunostomy was more desirable than gastrostomy or other types of jejunostomy.

The advantages of the Maydl jejunostomy are as follows: thick formulas can be inserted, an indwelling tube is unnecessary and there is no leakage of bile. Many of the jejunostomies were done because of obstruction of the pharynx, esophagus, or stomach by inoperable carcinoma.

In the operative technique, the jejunum was sectioned 8 to 10 inches below the ligament of Treitz. The proximal end of jejunum was anastomosed to the jejunum 18 to 20 inches from the point of section. The distal jejunum was drawn through the abdominal wall via a separate incision. The bowel was sutured to skin margins.

Serious complication resulted when the limb from the abdominal stoma to the jejunojejunostomy was too short. This resulted in leakage and digestion of skin. Attempted control of leakage was tried in one case, using a Foley bag, but this resulted in necrosis of the jejunum with peritonitis and death. Of these two complications among 34 cases, the abdominal limbs were 6 inches and 10 inches, respectively. The average for a well functioning jejunostomy was 18 inches.

Feedings with glucose, water, or skimmed milk may be started the first day after operation. Subsequent feedings are based on a diet of milk to which protein, sugar, or vitamins may be added.

Glucose absorption studies were carried out in 7 patients. Hyperglycemic and hypoglycemic episodes were noted, but a "dumping syndrome" was not experienced. Furthermore, sudden distention of the jejunum did not elicit this syndrome.

Metabolic studies revealed that most patients were in positive nitrogen balance. Fats were poorly handled in the early postoperative period. The addition of emulsifying agents improved the absorption of fat.

R. L. LAWTON, M.D.

Critical Evaluation of Jejunostomy. THOMAS BOLES JR., and ROBERT M. ZOLLINGER. *Arch. Surg.*, 1952, 65: 358.

The difficulty of maintaining adequate nutrition with intravenous infusion prompted the authors to seek a practical, more positive method of feeding. Jejunostomy was selected and metabolic studies were undertaken to prove or disprove the efficacy of certain feeding regimes.

The basis of the pabulum used was homogenized milk, each 1,000 c.c. of which contained 35 gm. of

protein, 700 calories, and about 4 per cent of fat. In the badly depleted patient starch hydrolysate and protein hydrolysate was added to the milk. In the potassium-deficient patient a special solution of potassium salts was added, 27 milliequivalents three or four times daily.

In the metabolic studies the volume of feedings was kept at 2,400 c.c., given in 10 equal feedings. Homogenized milk was used in 11 cases and a positive nitrogen balance was maintained.

Analysis of feces revealed a 65 to 82 per cent utilization of fat (normal 95% plus). The addition of an emulsifying agent increased the amount of absorption. The fat in the feedings was increased upwards to 8 per cent, but this could not be tolerated because of cramps and diarrhea. Even concentrations of 6 per cent produced symptoms of intolerance. After 7 to 10 days, enrichment of the feedings with 60 gm. of starch hydrolysate and 50 gm. of protein hydrolysate per 1,000 c.c. can be tolerated.

The regulation of feeding is most important and has to be individualized. No feedings are given for 12 to 18 hours after operation. After this period small amounts of feedings (50 c.c. of 5 per cent dextrose) may be introduced into the tubing. When bowel activity becomes evident, homogenized milk is started (50 c.c. hourly).

For short term feedings, 2,000 c.c. of homogenized milk daily is adequate. The use of liquid petrolatum early in the postoperative course favored peristaltic activity.

The technique utilized was that described by Stamm. The area selected for jejunostomy was in the jejunum, far enough distal to the ligament of Treitz to allow easy apposition to the anterior abdominal wall. The catheter is brought out through a stab wound.

In the space of 4 years, 103 jejunostomies were done, the majority as complementary procedures, but a few as primary operations. The most frequent operation associated with jejunostomy pertained to the stomach (76 cases). In 12 cases the primary operative procedure was on the biliary tract; operations involving the pancreas, duodenum, and esophagus made up the remainder of those considered here.

In 27 cases the procedure was considered quite beneficial, as was evinced by a marked change in nutritional status. In several cases it was considered life-saving. Fifty-six patients derived some benefit from the procedure, whereas in 20 patients it was considered of no value. In this latter group the feedings were poorly tolerated and associated with distention and abdominal cramps.

Complications directly associated with jejunostomy were nonexistent. The tubes were left in situ for periods varying between 4 and 110 days, although in most instances they were removed in 10 days. In no case did drainage persist from the tract for more than a week. In most cases drainage ceased within a period of 48 hours.

R. L. LAWTON, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Experimental Studies on the Ligation of the Hepatic Artery (Ricerche sperimentali sulla legatura dell'arteria epatica). G. ZANNINI and G. ESPOSITO. *Arch. ital. chir.*, 1952, 75: 312.

In this study 30 dogs were used. In 4 of these animals the hepatic artery and all its branches were ligated, without further treatment. All of these animals died. A fifth animal, in which only the hepatic artery was ligated near its origin, survived and seemed none the worse for the experience. In another 4 animals the surgical intervention was the same as in the first 4 mentioned; however, the operation was immediately followed by the usual treatment with penicillin (*Surg. Gyn. Obst.*, 1950, 91: 680). Of these animals, 2 survived. In a further 7 animals the same operative interference was followed by adequate treatment with terramycin; 3 of these survived. In 7 animals the same operation was followed immediately by treatment with aureomycin; 5 of these animals survived, and in those which did not survive the changes were less fulminating and less extensive than with the other methods used. Finally, 7 animals with the same operative work were treated immediately after operation with sulfonamides. None of these animals survived; indeed, there seemed to be no difference in the postoperative course from that in untreated animals.

The, clinical manifestations and the histologic findings were pretty much the same whether the animal lived or died and, in fact, they were not essentially different from those originally described by Markowits, Rappaport, and Scott (*Proc. Soc. Exp. Biol.*, 1949, 70: 305) or other authors since. The author differs from some of the others in that he did not find any essential difference between the results in cholecystectomized and noncholecystectomized animals.

From his studies in this series of experiments the author concludes that there are 3 chief factors at work in these results. The first factor predominates in the early deaths; it consists of the immediate postoperative overgrowth of anaerobic microorganisms. The organisms isolated by the author rather closely resembled the Clostridium perfringens. This would seem to represent the principal factor in the death of the untreated animals and of those treated with the sulfonamides.

The second factor consists of anoxia of the tissues and produces the necroses, cloudy swelling, and edema of the liver parenchyma which is observed in the later periods in the animals which do not die at once. The changes may be diffuse or they may be of a more localized character, with attempts of the organ to delimit the processes at work (proliferation and invasive ingrowth of the connective tissue stroma). These changes seem to be unaffected by the antibiotic therapy.

The third factor is represented by the attempt of the liver to gain a blood supply through the col-

laterals. This action is usually ineffective but may, however, explain why the more severe lesions tend to involve the left lobe of the liver which is excluded from the influence of the collaterals coming through the coronary ligaments.

On the whole, the author concludes that his studies indicate that the simple interruption of the hepatic artery is not an event which is particularly dangerous, especially if accompanied by adequate antibiotic therapy. JOHN W. BRENNAN, M.D.

Plasma Cholinesterase Activity in Liver Disease: Its Value as a Diagnostic Test of Liver Function Compared with Flocculation Tests and Plasma Protein Determinations. ANDREW WILSON, R. J. CALVERT, and H. GEOHEGAN. *J. Clin. Invest.*, 1952, 31: 815.

The plasma cholinesterase activity of 100 normal subjects, 44 convalescent hospital patients with no history or clinical evidence of liver disease, and 33 patients with liver disease was studied. It was shown that, compared with normal subjects and convalescent patients, there is a significant difference in the plasma cholinesterase activity of patients with liver disease.

Values for plasma cholinesterase activity lower than 936 ($ulCO_2$/ml./hr.) are regarded as being abnormal.

The results of plasma cholinesterase determinations were compared with those of flocculation tests and of plasma albumin and globulin estimations in 15 patients with acute, 4 patients with subacute, and 14 patients with chronic liver disease, and in 10 patients with extrahepatic biliary obstruction. In patients with severe acute and subacute liver disease, low plasma cholinesterase values provide confirmatory evidence of considerable impairment of liver function. In patients recovering from acute and subacute liver disease, estimations of plasma cholinesterase activity afford an immediate useful prognostic indication of the recovery of function of the liver, since the plasma cholinesterase level returns to within normal limits in advance of the flocculation tests.

In patients with chronic liver disease, in whom the flocculation tests are sometimes normal, plasma cholinesterase and albumin levels are usually lower than normal. This evidence, however, does not appear to discriminate between cirrhosis and malignant disease of the liver.

Normal values for plasma cholinesterase activity were usually observed in patients with extrahepatic biliary obstruction of short duration; low values occur, however, during attacks of cholangiohepatitis and in patients with malignant disease and prolonged obstruction. In the differential diagnosis of jaundice, the results of this test are less precise than those of the flocculation tests in defining an extrahepatic cause for the jaundice, but when taken in conjunction with the flocculation tests they provide reliable information regarding impairment of liver function. FREDERICK W. PRESTON, M.D.

Liver Resection in Primary Malignant Hepatoma. T. GUNNAR NYSTRÖM. *Acta chir. scand.*, 1952, 103: 241.

The resection of primary malignancies of the liver is rare. A combination of favorable circumstances is required to make surgical treatment possible. Among these is the presence of a solitary tumor of the hepatic but not of the biliary tissue which is discovered early by the patient; it must be peripherally located in the liver substance and solitary, and not have metastasized.

The author describes a tumor which was discovered early by the patient; it was of the solitary hepatic type and anteriorly located. It was excised by surgical diathermy; mattress sutures were placed before excision, with ligation of open bleeders and apposition of the resected surfaces. Gelfoam and an omental graft were used for hemostasis. These procedures are essential to insure hemostasis.

The author's patient is living and well 1 year after operation. ERNEST D. BLOOMENTHAL, M.D.

Clinical Experiences in So-called Cholecystopathies (Beitrag zu den klinischen Erfahrungen bei sogenannten Cholezystopathien). H. SPAENGLER. *Wien. med. Wschr.*, 1952, 102: 653.

Functional disturbances in the motility mechanism of the walls of the gallbladder and the bile ducts may closely simulate the clinical picture of cholecystitis and cholelithiasis. Frequently it is extremely difficult to differentiate these dyskinesias from inflammatory processes. Also roentgenologic examination fails in many instances to reveal the true nature of the condition.

In a series of 1,400 cholecystectomized patients at the First Surgical Hospital of the University of Vienna, Austria, there were 126 who clinically presented the picture of cholecystitis or cholelithiasis but showed no (or only minimal) evidence of disease on histological examination of the extirpated gallbladder. It is not surprising that the late results of the operation in these functional cholecystopathies were unsatisfactory.

The author was able to follow up 73 of the 126 patients. Only 18 of them were cured by cholecystectomy; in 55 (75.3%) the complaints and clinical symptoms remained more or less unchanged after the intervention. WERNER M. SOLMITZ, M.D.

The Effect of Double Vagotomy on the Motor Activity of the Human Gallbladder. FRANK E. JOHNSON and E. A. BOYDEN. *Surgery*, 1952, 32: 591.

In 11 of a total of 13 male patients studied for a period of 3 years, satisfactory series of cholecystograms were obtained both before and after vagotomy. These patients could be divided into two natural groups.

Group A, which is designated as the negative control group, consisted of 5 patients in whom the vagotomy was incomplete, as revealed by the Hollander insulin gastric secretion test. With one exception, explainable on other grounds, these con-

tinued to exhibit the rapid evacuation of the gallbladder, which is characteristic of patients with peptic ulcer.

Group B consisted of 6 patients in whom the vagotomies were complete initially. In all these cases the rate of emptying the gallbladder was significantly retarded after vagotomy, but the rate was not less than that of normal individuals of corresponding sex and age. Accordingly, it was concluded that the vagi are not essential to evacuation of the human gallbladder (as contrasted to laboratory animals) and that emptying is regulated primarily through a hormonal mechanism. However, in these 6 patients the fasting volume of the gallbladder was approximately doubled after vagotomy. This is believed to be due to the loss of vagus fibers which normally maintain the tonus of the gallbladder during periods of indigestion. When this tonus fails, the viscus is unable to resist the influx of liver bile as efficiently as before, hence the gallbladder progressively enlarges. The question is raised as to whether such enlargement may lead to gallbladder disease. JOHN J. MALONEY, M.D.

Recent Trends in Gallbladder Surgery. W. H. COLE. *J. Am. M. Ass.*, 1952, 150: 631.

The belief that cholecystitis starts primarily as a chemical lesion has become more and more prevalent. The author is convinced that the infectious phase of cholecystitis is usually superimposed on an initial chemical inflammation. The role of infection in gallbladder disease has definite clinical significance, particularly in cases of fulminating acute cholecystitis when there may be doubt as to whether cholecystectomy or cholecystostomy should be performed. When systemic reaction is severe, the demonstration of numerous bacteria on a smear made from bile aspirated from the gallbladder at the operating table may correctly indicate the performance of cholecystostomy instead of cholecystectomy.

Of 211 consecutive patients having had cholecystectomy at the Illinois Research Hospital in Chicago during the past 3 or 4 years, 45.6 per cent had pain only in the right upper abdominal quadrant. Pain was located in the epigastrium alone in 27.2 per cent, and in the epigastrium as well as the right upper abdominal quadrant in 18.9 per cent. In 5.3 per cent of the patients, the pain was located elsewhere, including the left upper abdominal quadrant and precordium. Although the pain of cholecystitis may be referred to anatomic areas other than the right upper abdominal quadrant, this happens only occasionally, and the clinician must be cautious in blaming the gallbladder for the symptoms. In atypical cases this is true particularly since gallbladder disease, including cholelithiasis is so common and will frequently be present along with other diseases. The average attack of pain in gallbladder disease is of short duration. In 41.7 per cent of the aforementioned patients, the pain lasted less than 1 hour and in 12.6 per cent of the patients the pain actually lasted less than 15 minutes. In about one-half of these patients the pain was constant and in the other half it was of an intermittent or colic type. An important diagnostic feature of cholecystitis and cholelithiasis is the fact that the pain comes in attacks and is not constant over a period of several days unless empyema or some such complication exists. The pain may be completely absent in patients who have had a sympathectomy, as for hypertension. In certain patients with angina associated with gall stones, removal of the stones will relieve the major part of the anginal symptoms.

The most common cause of jaundice is virus hepatitis, but the most common cause of jaundice in disease of the biliary tract is a stone in the common duct. If jaundice is caused by a stone in the common duct and the patient is seen early before liver disease is produced, results of liver function tests are almost invariably negative, although the alkaline phosphatase test is usually positive (above 10 if the jaundice is of the obstructive type). The thymol turbidity and the cephalin flocculation tests are positive in cases of virus hepatitis in most instances. About 80 per cent of the patients with a stone in the common duct have pain. Blockage of the common duct by a stone is usually intermittent but occasionally may be complete for weeks. If pain is very severe, one can usually exclude virus hepatitis and the early stage of carcinoma of the pancreas. If the stools are intermittently acholic, one can usually exclude carcinoma of the head of the pancreas because in that disease the stools remain acholic once they have become so.

Jaundice and disease of the biliary tract are not often associated with stones in the common duct. In 110 cases of jaundice associated with biliary tract disease, Gaster noted an indication for exploration of the common duct in only 61 per cent of the patients; stones were found in only 49 per cent of these cases.

If a surgeon finds a hard mass in the region of the terminal end of the common duct, it is helpful diagnostically to puncture this mass with a hypodermic needle. If the mass is a stone lodged in the pancreatic portion of the common duct, the needle will, of course, meet with complete resistance. If the mass is a tumor, the needle will penetrate it. As it does so, one may feel a grating sensation if the mass is cancer. The author has found this diagnostic puncture very helpful in differentiating stone from tumor or pancreatic nodule.

If the jaundice is obstructive in type, it will be necessary to open the common duct in almost every case and explore it for stones. If after removal of all stones the duct is still obstructed so that the lead probe will not pass through the sphincter of Oddi into the duodenum, it will be necessary to open the duodenum and inspect the duodenal papilla. If a tumor mass is present at the ampulla of Vater, there is a strong probability that it is malignant. Radical resection will be indicated for cancer of the ampulla because the 5-year survival in cases of this type of tumor is fairly good. Frozen sections are not satis-

factory in differentiating benign from malignant lesions in the presence of a granulating mass at the sphincter of Oddi.

Acute cholecystitis. The author is now of the opinion that if a patient is seen within 36 to 48 hours of the onset of symptoms and the diagnosis is definitely that of acute cholecystitis, immediate operation is justifiable. Cholecystectomy is the operation of choice but about 5 per cent of the patients will be so ill or the inflammation will be so acute that cholecystostomy will be indicated. In general, if the patient is first seen more than 48 hours after onset of the attack, the author considers immediate cholecystectomy undesirable because inflammation may have progressed so far that cholecystectomy may be difficult and hard on the patient. If the conservative attitude is adopted, certain precautions should be taken. If the pain does not subside within a few hours after the institution of bed rest, if the pulse rate increases, if muscle spasm remains or develops, or if fever persists or develops, there is indication that perforation is pending and an emergency operation is usually advisable. If the acute attack subsides readily, it is usually desirable to wait 4 to 6 weeks before doing cholecystectomy. Regardless of the choice of time for operation, it must be remembered that stones are present in the common duct in 4 to 5 per cent of the patients with acute cholecystitis; their removal is strongly indicated unless the patient's condition becomes so critical on the operating table that the additional operating time threatens life.

It is the author's opinion that any patient under 45 years of age with an average life expectancy and silent stones, should be subjected to cholecystectomy for removal of the stones. In 1 or 2 per cent of the patients, gallbladder disease may exist despite a normal cholecystogram. A cholecystectomy may relieve all symptoms. In general, one should be influenced by the symptoms. If they are severe and typical of gallbladder disease, then operation is justifiable. In such cases it is usually advisable to remove the gallbladder even though it appears fairly normal. Fortunately, this group of patients is small, but the decision as to advisability of operation will often be difficult to make.

The indications for opening the common duct are as follows: (1) palpable stone, (2) dilated duct, (3) thickened wall of the duct, (4) gallbladder with small stones and large cystic duct, and (5) history of jaundice with pain.

In the series of 211 consecutive cholecystectomies at the Illinois Research Hospital in Chicago, the common duct was opened in 19 per cent of the cases and stones were found in 61 per cent of the group in which exploration was done. In follow-up studies the author and his associates encountered few stones in the common duct, which were not explored, but they encountered two or three recently in patients in whom stones were missed during exploration of the common duct. A cholangiogram cannot be considered entirely accurate in diagnosing stones. In exploration of the common duct for stones, extreme care must be exercised in the way in which the scoop is used because careless passage of the scoop up or down the duct may simply push the stone ahead of it. The author prefers a long, narrow scoop and believes that by pressing it against the posterior wall as it is passed into the duct there will be less probability that a stone will be pushed ahead of the scoop. When all stones are removed, it is essential to pass a lead probe through the sphincter of Oddi into the duodenum, particularly if the patient is jaundiced.

Certain procedures are necessary in the safe performance of cholecystectomy to avoid damage to the common duct and prevent the later development of stricture. Adequate exposure must be obtained with a long incision. The surgeon must not be in a hurry. The cystic duct and cystic artery must be ligated separately. No artery should be ligated until it is proved that it enters the gallbladder wall. It should be remembered that one or more anomalies, such as accessory cystic artery, accessory hepatic duct, hepatic artery anterior to the common duct, and a very large, short cystic duct occur in 12 to 18 per cent of the patients. If sudden severe hemorrhage develops during cholecystectomy, it should be controlled by pressure of the thumb against the index finger in the foramen of Winslow (epiploic foramen) rather than by grasping the bleeding point blindly with an artery forceps. Starting the dissection of a cholecystectomy at the ampullary end of the gallbladder is safer than starting at the fundus except when there are many adhesions about the common duct. The author drains Morison's pouch with a Penrose drain for approximately 48 hours because of the danger of escape of bile through several accessory hepatic ducts, some of which may be so small that their identity may be difficult at the time of operation. After opening the common duct, drainage is carried out with a T-tube for 12 to 18 days postoperatively. Prolonged drainage is undesirable because of the loss of bile and because rubber is irritating to the duct.

The cause of the postcholecystectomy syndrome may be difficult to determine. One must first eliminate the possibility that disease outside the biliary tract may be the cause of symptoms. Duodenal ulcer, gastric ulcer, hiatus hernia, constipation, arthritis of the spine, pancreatitis, cancer, and psychoneurosis are commonly confused with gallbladder disease. Not the least important in this group is psychoneurosis which may be extremely difficult to differentiate from gallbladder disease. Diagnostic paravertebral block may be helpful in such cases insofar as the injection of procaine hydrochloride should relieve the pain, while injection of isotonic sodium chloride solution should not. The true postcholecystectomy syndrome should apply to lesions primarily in the biliary tract that may cause persistent symptoms. Stone in the common duct is perhaps the most common cause of persistent symptoms after cholecystectomy (45 per cent of

patients with stone in the common duct will not have jaundice). Chronic pancreatitis resulting from frequent attacks of acute pancreatitis may produce a fairly constant pain. The amylase test will be helpful in identifying it. Although a dilated stump of the cystic duct has been reported as being a common cause of persistence of symptoms, the author has seen only 1 case of this type. Biliary dyskinesia (spasm of the sphincter of Oddi) or obstruction of the duodenal papilla or sphincter of Oddi by scar tissue occurs occasionally. Neuromas occurring in nerve fibers about the common duct have been described as well as relief from pain following excision of these nerve filaments. Strictures will occasionally occur in patients who have symptoms following cholecystectomy. A diagnosis of stricture of the common duct is usually made fairly easily on the basis of the history of cholecystectomy, an attack of jaundice, and acholic stools associated frequently with chills.

The mortality rate of cholecystectomy in the past few years is about 2 per cent. Gaster reported a mortality rate of 2.1 per cent and when choledochotomy was added to cholecystectomy the rate was 3.4 per cent. A striking point in his report was a mortality rate of 5.8 per cent in patients past the age of 50, but only of 0.6 per cent in patients under 50 years of age. This represents a rate in the older group almost ten times that in the younger group. Glenn found a mortality rate of 9.6 per cent in patients over 50 and one of 1.5 per cent in patients under 50 years of age who had undergone choledochostomy. The author believes that at the present time the mortality rate for cholecystectomy is about 0.5 per cent, and from 1.5 to 2 per cent in patients having cholecystectomy plus choledochotomy.

The symptomatic results following cholecystectomy depend largely on the accuracy of diagnosis and percentage of patients with severe pain in this group. Good to excellent results will be obtained in from 90 to 95 per cent of the patients having cholecystectomy for severe pain in the right upper abdominal quadrant but good to excellent results will be obtained in only 50 to 60 per cent of the patients having dyspepsia and mild atypical pain, particularly if no stones are present.

EARL O. LATIMER, M.D.

The Diagnosis of Pancreatic Disorders by Certain Laboratory Procedures. WILLIAM W. SHINGLETON, WILLIAM G. ANLYAN, and DERYL HART. *Ann. Surg.*, 1952, 136: 578.

The evaluation of pancreatic function in health and disease by test measurements has been slow because of the lack of a large series of available patients. The use of secretin, as a stimulus, and the analysis of samples of the duodenal juice obtained through an indwelling gastroduodenal tube have been reported. The original analysis included the estimation of the volume of secretion, bicarbonate content, and the pancreatic enzymes, amylase, trypsin, and lipase. These studies revealed a rather wide variation in normal values, but significantly low values in cases of proved pancreatic disease.

The secretin test was performed in 75 patients. The results were too varied to be of material assistance. The serum amylase determination after pancreatic stimulation with secretin alone or with secretin and urecholine did not yield information of diagnostic aid in chronic pancreatic disease.

Changes in blood coagulability associated with pancreatic disease were then studied. By the use of a sensitized clotting test before and after the administration of a pancreatic stimulant, a change in blood coagulability was found in a significant number of patients with chronic relapsing pancreatitis and pancreatic carcinoma.

The test consists in adding sodium polyanhydromannuronic acid sulfate (paritol-C), a synthetic heparinoid, to nine Wassermann tubes in graded concentration from .18 mgm. in tube 1 down to .02 mgm. in tube 9. A tenth tube, containing 0.1 ml. of veronal buffer (*p*H 7.3–7.4) serves as a control. A 10 ml. sample of blood is drawn by a clean venopuncture into a desiccated 20 c.c. syringe with a 20-gauge needle, and 1 ml. of blood is added immediately to each of the ten tubes (starting with tube 1) following the removal of the needle from the syringe. The tubes are corked and tipped to 80 degrees from the vertical twice; the specimen is then set aside at room temperature, and 30 minutes from the time of emergence of blood into the syringe the tubes are tilted (starting with tube 1) to determine the tube with the first gel-clot.

To be considered a positive test, a minimum change of two tubes toward tube 1 was deemed necessary following the injection of the drugs. Using secretin alone, positive tests were obtained in 6 of 11 patients with carcinoma of the pancreas, 6 of 8 patients with chronic pancreatitis, and in only 1 of 35 patients in the control group. With secretin and urecholine in combination, positive tests were noted in 5 of 8 patients with carcinoma of the pancreas, in neither of 2 patients with chronic pancreatitis, and in 6 of 18 control patients.

It is hoped that future studies with this test may prove it to be of value in revealing early derangement in pancreatic function and thus supplement the secretin test in the diagnosis of pancreatic disorders.

STEPHEN A. ZIEMAN, M.D.

Insulin Tumors of the Pancreas. JOHN MORLEY. *Brit. J. Surg.*, 1952, 40: 97.

The diagnosis of insulin tumors of the pancreas is based on Whipple's (1944) triad of symptoms:

1. Nervous, or occasionally gastrointestinal, attacks in the fasting state.
2. A fasting blood sugar of 50 mgm. per cent or lower. (In 80 per cent of the cases it is below 40 mgm. per cent.)
3. Immediate, or almost immediate, relief from the ingestion of glucose.

The nervous symptoms that suggest such a tumor are numerous but are well remembered by alliteration

as beginning with the letter C. They are confusion, convulsions, and coma, and in view of the periods of meaningless laughter in 2 of the author's cases, he adds cachinnation. All too frequently these patients are diagnosed as suffering from epilepsy or confusional or hysterical states, and even cerebral tumors. Many are wrongly regarded as alcoholics. There are numerous other causes of hypoglycemia but if a patient presents Whipple's triad of symptoms, and if gross hepatic disease or pituitary or adrenocortical deficiency can be excluded, an insulin tumor will be found in all probability. Recently, Crain and Thorn have described a simple subcutaneous adrenalin test which excludes anterior pituitary or adrenocortical deficiency, and a subcutaneous adrenocorticotropic hormone test which excludes adrenocortical deficiency.

Insulin adenomas may occur at any age but are most common in patients between 40 and 50 years old. There is no significant difference between the sexes as regards frequency.

Number of tumors. Crain and Thorn collected 228 cases of benign adenomas and 24 malignant tumors. Of the 228 benign tumors, 206, or 88 per cent, were single and only 22, or 12 per cent, were multiple and then only 2 were present as a rule. Of the 24 malignant tumors, 20 were single and 4 were multiple. There were 6 cases of diffuse adenomatosis of the pancreas.

Size of the tumors. The majority of the tumors (75%) were between 1 and 3 cm. in diameter. The largest recorded was 11 cm. in diameter. The size of the tumor is not significantly related to its functional activity. Some of the smallest tumors gave rise to the most profound hypoglycemia. In the author's cases, the 4 patients who had a tiny single adenoma in the tail of the pancreas had symptoms just as dramatic as those of the patient with five adenomas.

Distribution of the tumors. Insulin tumors of the pancreas occur fairly evenly throughout the various parts of the pancreas, and not so predominantly in the tail as some authors have suggested. They are much more easily palpated in the tail and in the head or neck of the pancreas and this may account for the preponderance as reported lying in the tail. Nine cases of insulin tumors in an ectopic pancreas, in the duodenum, or in the immediate vicinity of the pancreas have been recorded.

Malignancy. Although less than 10 per cent of these tumors are definitely malignant as proved by metastases in distant parts, such as the liver or lymph glands, a considerably greater proportion have been suspected of local malignancy on the purely histologic evidence that the growth had breached the capsule in one or more places. A number of careful 5 year follow-ups of considerable groups of such cases has shown that they do not recur or give rise to later metastases.

Duration of the preoperative symptoms. In many of the recorded cases the patients have had symptoms for many years that were finally proved to be due to hypoglycemia. The longest case on record was 20 years. One of the author's patients had epileptiform fits for 9 years. In the recorded cases, 75 per cent of the patients have had preoperative symptoms for more than 4 years. In the comparatively rare case of proved malignancy, the history is almost invariably under 2 years' duration.

The author describes 5 cases of benign insulin adenomas of the pancreas successfully removed by operation and 1 case of suspected insulin adenoma treated by subtotal resection of the pancreas. He also describes 1 case (fatal) of insulin carcinoma of the pancreas. He stresses the importance of the glucose tolerance test on the ambulant patient and suggests that the test be prolonged for 5 hours instead of the usual 2½ hours. EARL O. LATIMER, M.D.

Anatomohistopathologic Study of Primary Malignant Mesenchymal Tumors of the Pancreas. Case History of a Fusocellular Sarcoma and a Lymphosarcoma (Il profilo anatomo-isto-patologico dei tumori mesenchimali primitivi maligni del pancreas. Contributo casistico. Sarcoma fuso-cellulare e linfosarcoma). GIAN FRANCO AMUNNI. *Arch. ital. mal. app. diger.*, 1952, 18: 79.

One case each of fusocellular sarcoma and of lymphosarcoma are reported.

The fusocellular sarcoma of the pancreas occurred in a 65 year old female. No clinical data on this patient could be found as she had died in 1942 and the records had been lost. Pertinent portions of the autopsy report showed the following: a massive neoplasm predominantly involving the tail and body of the pancreas. There were metastases to the stomach, liver, spleen, kidneys, and peritoneum. The lymph glands of the mesentery and retroaortic region were also involved in the neoplastic dissemination.

The histologic examination disclosed a notable rarefaction of the pancreatic parenchymatous tissue which had entirely disappeared in the tail and body of the organ. The tumor cells were of the fusocellular type; the protoplasm was not sharply delimited, but was slightly eosinophilic with hypochromatic nuclei here and there. The cells were arranged in fascial bands intersecting and occasionally exhibiting a whorled arrangement. There was marked cellular atypia with monstrous nuclei, cariogenesis, and irregular shapes. In places the tumor tissues assumed a reticular aspect, with fine fibrils of protoplasm. The structure of the metastases was similar to that of the primary tumor.

The lymphosarcoma involved the pancreas of a 36 year old female. For approximately 1 month this patient had been suffering with deep pains in the left hypochondrium, which became progressively accentuated. There was a tendency toward constipation. The general condition was good, on the whole. There was deep sensibility to palpation in the left hypochondrium and a hard mass could be felt in this region, which was displaceable in an upward and downward direction; however, there was no detectable respiratory movement.

Operation uncovered a light-grayish mass in the tail of the pancreas; it was a firm mass the size of an adult fist and with a rugous surface. The tumor was removed together with the tail of the pancreas and the stump of the organ was ligated. The patient recovered without incident and 6 months later was without evidence of recurrence or metastasis.

The histologic examination disclosed a tumor without evidence of pancreatic tissue. The tumor tissue was monomorphous and consisted of rounded elements, the cells exhibiting a diameter of 6 to 8 micra. The protoplasm was scarce and slightly basophilic and the nuclei were hyperchromatic, the whole resembling perfectly the structure of a common lymphocyte. A few larger elements resembled lymphoblasts. The disposition of the tumor cells was compact and stromal elements were meager. In places the stroma was more abundant and arranged in fascial bands. The picture was typical of lymphosarcoma. The pancreatic residues were apparently a prey to regressive or necrotic changes.

In the 19 cases of this tumor reported in the Italian literature and approximately 100 cases in the world literature there was no instance correctly diagnosed preoperatively as sarcoma of the pancreas. The clinical findings in no way differed from those of carcinoma of the pancreas; the only apparent means of recognizing the nature of the neoplasm lies in its more rapid growth. JOHN W. BRENNAN, M.D.

Carcinoma of the Pancreas. EUGENE E. CLIFFTON. *Arch. Surg.*, 1952, 65: 290.

The author reviews 135 cases of carcinoma of the pancreas, the ampulla of Vater, and the ducts within the head of the pancreas or duodenum. In 122 cases the tumor had been found to occur in the region of the head of the pancreas. In 75 of these the diagnoses were proved pathologically (at autopsy in 21). In 19 of the cases with proved diagnoses the patient had a palliative type of operation with an operative mortality of 57.8 per cent and an average survival of 3½ months. These cases were collected from the Tumor Registry of Yale University since 1923. It is significant that among the 75 cases in which the diagnosis was pathologically proved, 20 were found only at autopsy; the majority of the latter were carcinomas of the body or tail of the pancreas.

Twelve pancreatoduodenectomies were performed for carcinoma in the region of the head of the pancreas, with a mortality of 33.3 per cent and an average survival of 2½ years for patients who were operated upon more than 1 year before the preparation of this report. Three patients are still living—one over 6 years, one over 1 year and 3 months, and one over 6 months.

Since the incidence of carcinoma of the pancreas is not rare, this problem seems to have resulted in less desirable outcome of treatment because of (1) the failure of early diagnosis, (2) the high mortality of the radical surgical approach, and (3) the combined factor of difficulty in operative diagnosis and the frequency of explorations made with preoperative diagnosis of common duct stone by surgeons unfamiliar with the procedure of pancreatectomy. The belief that carcinoma of the pancreas is a silent lesion has been shown to be untrue in many studies.

Of the 122 cases in this series, an accurate estimate of the onset of symptoms could be made in 113. Thirty-four patients had symptoms referable to the lesion for less than 3 months, and 18 had had symptoms for more than 1 year. That these symptoms were real is confirmed by the early visit to a physician by those 63 patients from whom the information was obtained; 29 visited their physician immediately and 54 (85%), within 3 months of the onset of their symptoms. Pain was the most frequent symptom, being absent in only 19 (16.6%) of the patients. In 34 patients (20.8%) pain was a complaint for more than 4 months before admission to the hospital for definitive treatment. Anorexia and jaundice were symptoms of shorter duration. Significant weight loss had occurred before admission in 90 (84%) of the 107 patients on whom this information was obtained. In 48 of the 93 patients (50%) in whom the duration of weight loss was known, this had been observed for a period of more than 3 months. Despite these obvious signs of serious illness, jaundice was the only symptom or sign actually used in bringing patients to treatment in an operable state. Jaundice was noted in 87 of the 122 patients, and in 41 of these it had been present for 1 month or was first observed after the patient's admission to the hospital. In 18 of these patients it had been noted for 2 or more months before definitive treatment.

The presence of clinically determined physical signs was less apparent. An enlarged hard liver was present in over half (66) of the patients. This finding, however, did not of necessity indicate inoperability, since in many instances the condition was due (as shown in autopsy series also) to hepatitis or ascending cholangitis. The presence of a distended gallbladder was noted in only 26 cases, although the gallbladder and the common duct were found to be distended in over 50 per cent of the cases in which exploration was done. A distinct mass in the region of the pancreas was even less frequently reported (18 times).

In the total group of 122 cases, 96 patients had adequate roentgenographic examinations. Only 8 had signs such as widening of the duodenal loop, considered diagnostic of carcinoma in the region of the head of the pancreas. Three of the patients on whom resection was done did have some duodenal deformity, and one of these was a patient who survived 5 years and 4 months. Two others have evidence of extrinsic pressure on the duodenum, probably from a distended gallbladder.

This summary indicates that of the 33 cases in which the patients were not operated upon, the average survival time was 5 weeks, with a maximum survival of 4 months. Among 28 patients subjected

to exploration, the postoperative mortality was 19.5 per cent and the longest survival was 16 months, with an average of 3½ months. In 42 cases the patients had sidetracking operations and the postoperative mortality in this group of cases was 31 per cent. In 19 of these cases in which a positive pathological diagnosis was obtained, the operative mortality was 57.8 per cent. The maximum survival in this group with pathologically proved carcinoma was 17 months, with an average of 5½ months. Twelve patients with carcinoma involving the head of the pancreas had resection of the head of the pancreas, duodenum, and distal stomach with choledochojejunostomy, closure of the pancreatic stump, and gastrojejunostomy. Four of these succumbed postoperatively, an operative mortality of 33.3 per cent. Eight operations were done in one stage with a 37.4 per cent hospital mortality, and 4 were done in two stages with 1 death, or a 25 per cent mortality. One patient survived for 5 years and 4 months and died of probable recurrence, 1 patient still survives, over 6 years after resection without recurrence, and 2 other recent patients still live, one over 1 year, and the other 4 months after surgery.

Of the 39 patients who were treated from 1941–6, the period during which 5 year survivors could have appeared in a resected series, diagnoses were pathologically proven in 27. In 8 patients resections were done; 2 of these patients survived for more than 5 years. It would appear from a survey of the literature that there are at least 4 other 5 year survivals of carcinoma of the head of the pancreas, in addition to numerous survivals among patients with carcinoma of the ampulla of Vater.

Diagnosis at the time of operation has been a serious problem to most surgeons. In this group of cases diagnosis had apparently been successfully established either on clinical grounds or by pathologic investigation in all but 2 cases, and in one of these the error was due to the pathologist's mistake rather than that of the surgeon. However, in the past year at least 1 patient with a localized lesion failed to have a resection because of the surgeon's preoccupation with the absolute diagnosis. Once the diagnosis is made it is desirable to do the indicated resection. This series, with an operative mortality for palliative surgery of 38 per cent, compared to the mortality of 33.3 per cent for resections, and an average survival of 5.4 months with palliative treatment as opposed to 2.5 years with a resection, would not seem to support the opinion that sidetracking operations are better than resection.

Four cases are reported in detail.

LeRoy J. Kleinsasser, M.D.

MISCELLANEOUS

Eventration of the Diaphragm (In tema di patologia del diaframma: la "eventratio"). Giovanni Marcozzi and M. Maurizi Enrici. *Ann. ital. chir.* 1952, 29: 413.

The authors report on 5 cases of eventration of the diaphragm in adults. The first case was that of a 60 year old female with bronchiectasis of the right lower lobe. The second was that of a male 56 years of age with displacement of the spleen alone within the eventration. The other cases were those of a female 50 years of age, and 2 males, 40 and 38 years of age, respectively. Two of these were operated on, the 50 year old patient because of symptoms and the 38 year old patient to rule out hepatic cysts. The others had minimal symptoms. Four of the 5 presented pulmonary symptoms.

A review of the literature follows with a description of the anatomy, pathology, and clinical picture involved, adequately presented.

Lucian J. Fronduti, M.D.

GYNECOLOGY

UTERUS

Progress and Frontiers in the Early Diagnosis of Cervical Carcinoma (Fortschritte und Grenzen der Frühdiagnostik Des Kollum-Karzinoms). HANS-KLAUS ZINSER and HEINZ DIEGRITZ. *Geburtsh. & Frauenh.*, 1952, 12: 782.

The author reports his impressions and findings with the use of both colposcopy and the vaginal smear technique in the diagnosis of early cervical carcinoma, including carcinoma in situ. In the present study, 7,815 women were examined by one or both methods, most of them by both, during a 3 year period (1949–1951).

Colposcopy is valuable in the early diagnosis, although specialized training is needed. Colposcopy tends to miss early endocervical carcinoma. The cytologic method is more effective in this respect since it samples the cells of both the endocervix and the portio; also, it is easier for the general practitioner to utilize since he need only take smears and send them on to a qualified cytologist.

The author lists and analyzes 17 early cases of carcinoma in which colposcopy demonstrated uncharacteristic or normal findings but which showed cytologic evidences of malignancy. In 20 proved cases colposcopy was positive for malignancy in 10 instances, but in the remainder was only "suspicious."

The conclusions reached are that both colposcopy and cytology are valuable but that the latter method is more reliable in the accurate diagnosis of beginning cervical malignancy. WARREN R. LANG, M.D.

The Prognostic Value of Histological Grading of Carcinoma of the Cervix Uteri. F. LINELL and B. MANSSON. *Acta radiol.*, Stockh., 1952, 38: 219.

The literature on the prognostic value of the histologic grading of carcinoma of the cervix is reviewed. Three hundred and nine cases of carcinoma of the cervix uteri treated uniformly with radiation at the Gynecological Department of King Gustav's Jubilee Clinic, Lund, Sweden, and followed up for at least 5 years were examined. Of these cases 291 were squamous cell carcinomas and 18 were adenocarcinomas. Treatment consisted of radium and roentgen therapy. Of the patients who received a complete course, 42.6 per cent were cured for 5 years.

The material examined consisted of diagnostic biopsy specimens. The grading and other histologic details were noted without preknowledge of the later course of the disease. The cases were classed according to three histologic grades, which are described in detail. The amount of mitoses and stroma as well as the intensity of the reaction of the latter and its cellular type were also recorded.

The cases allotted to the various groups according to grading or other histologic characteristics did not differ significantly as regards prognosis. The results were, on the whole, in accord with those obtained by earlier workers in this field and suggest the conclusion that the histologic grading of carcinoma of the cervix uteri from diagnostic biopsy specimens is of no value for predicting the prognosis of patients to be treated with radiation. ALAN RUBIN, M.D.

Diagnosis and Treatment of Intraepithelial Carcinoma of the Cervix (Diagnostic et traitement de l'épithélioma pavimenteux intraépithélial du col utérin). P. FUNCK-BRENTANO, R. MORICARD, R. PALMER, J. DE BRUX, and H. WENNER. *Mém. Acad. chir.*, Par. 1952, 78: 629.

These associates from the Broca Hospital prefer the term intraepithelial carcinoma for the disease they are discussing. In a 1-year period they found 12 cases. The patients complained of sterility, metrorrhagia, leucorrhea, and premenstrual tension. Only 6 showed an erosion.

The site for biopsy was selected by the Schiller test and the colposcope. The authors did not consider the colposcope superior but they like to use it in the study of diseased cervices. They discuss the limitations of cytologic studies, one of the most important being the shortage of technical personnel. Although they found that the smear disclosed intraepithelial carcinoma earlier than any other method, they had 3 cases with negative smears. Biopsy was used for the final diagnosis in all cases. The shortcoming of the smear in following up cases of carcinoma after radiotherapy was that no information on lymph node metastasis was given. The authors lament the fact that the publicity given to early diagnosis in the press and on the radio resulted in the advertisement of smear services by pharmacies. Their treatment is total hysterectomy with preservation of the adnexa.

A discussant, MOULONGUET, can see no sense in removing the entire organ when the disease is confined to one small part of it; he amputates the cervix. Another discussant, DENOIX, makes a plea that all cases be submitted to the new Registry of Intraepithelial Carcinoma at the National Institute of Hygiene so that eventually some of the problems of this disease can be solved.

JAMES HENRY FERGUSON, M.D.

Surgical Therapy of Carcinoma of the Cervix (Zur operativen Therapie des Kollumkarzinoms). G. HALTER. *Wien. med. Wschr.*, 1952, 102: 621.

The author discusses the different methods of management of carcinoma of the cervix. For a number of years roentgen therapy was considered the treatment of choice by many gynecologists. However, lately the consensus of most European and American surgeons is that surgery offers better results in most cases. This change of attitude is due partly to the better chances provided by antibiotics

and chemotherapy and by the progress in technique of anesthesia and shock treatment. Another reason for preferring surgical therapy is the recent knowledge that certain types of carcinoma of the cervix are refractory to irradiation.

The advantages and disadvantages of the vaginal and abdominal routes are discussed. In a series of 210 patients with carcinoma of the cervix, laparotomy was performed on only 44 patients in whom the abdominal approach was indicated by certain complications such as far advanced tumor, edema of the vesical floor, pregnancy, and tumor of the adnexa.

The technique of the vaginal operation is discussed in detail. The author uses a modification of the method devised by Amreich. This surgeon severs the three portions of the parametrium (vesicouterine, transverse, and sacrouterine ligaments) separately. To isolate the ureter, the vesicouterine ligament is cut laterally. The cranial portion of the ureter is thus visualized first, before the prevesical portion.

The author of the present article modified this technique because of the danger of venous hemorrhage. He isolates first the prevesical portion of the ureter in situ before moving the bladder upward. Only after this has been performed is the vesicouterine ligament severed laterally to the ureter.

With this method it is possible to extirpate the regional lymph nodes in the parametrium.

WERNER M. SOLMITZ, M.D.

Cytologic Aspects of Carcinoma of the Corpus Uteri (Aspects cytologiques du carcinome du corps uterin). CL. GOMPEL. *Bull. Fed. Soc. Gin. Obst.*, 1952, 4: 242.

Among 2,362 patients subjected to vaginal cytologic study, there were 15 with proved adenocarcinoma of the fundus. In 4 of these the condition was clinically unsuspected. In 9 cases the clinical impression was confirmed by cytologic study and in 2 cases the diagnosis was arrived at without the aid of cytologic study.

Vaginal cytologic studies will greatly enhance the early diagnosis of carcinoma of the fundus. The presence of numerous endometrial cells in a vaginal smear should arouse suspicion. Abnormally heavy desquamation of endometrial cells is not necessarily a sign of cancer, but may be found with hyperestrinism, endometrial hyperplasia, and endometrial polyps. Details of cellular structure are of differential importance.

Increase in size of the nucleus and the presence of multiple nucleoli are significant. The surface of the nucleus may be calculated by measuring its diameters. While the nuclear surface of normal endometrial cells averages about 20–25 square micron, the malignant cells have nuclei with a surface of 50–75 square micron. The cytoplasm of malignant cells shows an indistinct outline and frequently contains vacuoles.

The author attributes phagocytic power to adenocarcinomatous cells; these may engulf other malignant cells, leucocytes, or cellular debris. They must not be confused, however, with histiocytes (macrophages).

Cells from endometrial carcinoma must be differentiated from histiocytes, atrophic menopausal cells, malignant and inflammatory cells from the cervix, and benign endometrial cells. Vaginal smears from patients with cancer will nearly always show red blood cells, leucocytes, and histiocytes.

Endometrial biopsy for diagnostic confirmation is recommended for patients with doubtful, as well as with positive, vaginal smears.

HERBERT TEICHNER, M.D.

Hysterectomy. JOHN C. BURCH and HORACE T. LAVELY. *Ann. Surg.*, 1952, 136: 720.

A series of 1,221 consecutive hysterectomies, with no deaths, is reported from Vanderbilt University School of Medicine, Nashville, Tennessee. This is in line with the general decline in mortality from hysterectomy. A method of evaluating the needs for, and effects of, hysterectomy is presented, with emphasis of the functional approach to surgery of the female pelvis.

The technique employed for total abdominal hysterectomy is described, and the authors' technique for locating the ureter and avoiding injury to it is presented. The index finger is placed on the peritoneal-covered posterior and inferior surface of the uterosacral ligament, and moved along this ligament to the side wall of the pelvis. Then the thumb is placed above the index finger on the anterior and inferior surface of the ligament so that the ligament is in contact with the opposed fingers. As the fingers move along the ligament toward the uterus they must of necessity pass over the ureter, and this structure is recognized by its cordlike feel (similar to the feel of the vas deferens), and the characteristic jump which occurs when the fingers pass over it. With practice, the ureter can be recognized by this method in almost every case. If the operator is unable to locate the ureter he should perform a completely intrafascial type of operation, because if he works within the uterovaginal fascia he cannot injure the ureter which lies outside this fascia. While the completely intrafascial operation gives a maximum of protection to the ureter, it is, in the authors' hands, a more difficult and bloody operation.

Certain aspects of preoperative and postoperative management are emphasized. Pertinent data of reported cases are summarized. ALAN RUBIN, M.D.

Positive Lymph Nodes Found by Radical Wertheim Operations (Positive Druesenbefunde bei der Wertheimschen Radikaloperationen). H. ZEITZ. *Geburtsh. & Frauenh.*, 1952, 12: 804.

The author, from the Heidelberg Frauenklinik, discusses the significance of positive lymph nodes found by Wertheim hysterectomy. On comparison of the results of the radical Wertheim operation with those of radiation (radium and x-ray) therapy no appreciable difference was found. It is not

known whether radiation or surgery is more effective in eliminating carcinomatous nodes since with the latter method nodes may be overlooked and with the former, sufficient radiation may not penetrate. On the other hand, normal tissue has a limit of tolerance to radiation that must be respected. With more efficient radiation techniques, however, perhaps this disadvantage can be overcome.

The author suggests the re-evaluation of the lymph node dissection procedure of Taussig, extension of the usage of the Brunschwig operation, and the attempt at different radiation techniques.

WARREN R. LANG, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Lesions of the Tubal Isthmus (Lesions de l'isthme de la trompe). J. DE PAEPE and R. DELCOURT. *Bull. Fed. Soc. Gin. Obst.*, 1952, 4: 286.

Nodular enlargements about the isthmus of the fallopian tube which are usually due to salpingitis isthmica nodosa or to adenomyosis can be visualized preoperatively through hysterosalpingography with lipiodol. Instead of the normally thin outline of the tubal lumen near the uterosalpingeal junction, there will be either a network of fine lacelike channels or several small, round, grapelike droplets.

Among 1,200 hysterosalpingograms, these findings were present in 32 cases (2.5%), in 12 of which they were found bilaterally, and in 20 cases on one side only. The grapelike pattern was observed in 19 cases, the fine lacelike channels in 7, and a combination of both in 6.

Operative specimens from 12 patients were available for histologic study. No relationship could be established between the appearance of the preoperative x-ray picture and the histologic findings.

HERBERT TEICHNER, M.D.

Struma Ovarii (Estruma ovarico). HUMBERTO ELGUETA E., VICTOR OPAZO M., and ALBERTO GUZMAN. *Bol. Soc. chilena obst. gin.*, 1952, 17: 44.

A case of this rare neoplasm, struma ovarii, is presented, and the literature is reviewed.

The patient was a 19 year old woman who had had an appendectomy at the age of 16. She had never been pregnant. Her menstrual periods were regular with severe dysmenorrhea since their onset. She complained of pain in the right lower quadrant, dysuria, and difficult defecation for a year.

Examination revealed a cystic, movable tumor of the right iliac fossa. On pelvic examination it could be felt bimanually with the uterus displaced posteriorly and to the left.

At exploration a smooth, white cystic tumor, 12 cm. in diameter, was found to have replaced the right ovary; it was removed.

Histologic examination showed characteristic thyroid tissue with colloid.

Recovery was uneventful.

HOWARD ULFELDER, M.D.

The Diverse Origins of Brenner Tumors. R. R. GREENE. *Am. J. Obst.*, 1952, 64: 878.

In attempting to elucidate the histogenesis of Brenner tumors, the author has studied serial sections of 14 such tumors. On the basis of this study, the author has classified these tumors into four groups.

The first group includes the tumors derived from the rete ovari. They were found to be in continuity with the rete and their epithelial elements were composed of interconnecting cords or tubules.

The second group was believed to be derived from the ovarian stroma and composed of masses with apparent transition of stromal to epithelial elements and with penetration of the reticulum fibers in and around the epithelial elements.

The third group included those derived from the surface epithelium of the ovary. Only 1 such case was found.

The fourth group was associated with pseudomucinous cystadenoma. The author considers the histogenesis of the tumors in this group to be similar to that of the third group.

HENRY C. FALK, M.D.

EXTERNAL GENITALIA

A Surgical Approach to Intractable Pruritis Vulvae. JAMES H. MERING. *Am. J. Obst.*, 1952, 64: 619.

The author gives a preliminary report of the results obtained by a new application of an old plastic procedure. The series of 12 cases represents a group of women with extensively treated, completely intractable pruritus vulvae of very long standing. All of the group were surgically treated by wide undermining of the skin of the vulva, vaginal mucous membrane, and anus, with extension outward into the skin of the thigh, perineum, and upward over the symphysis and groin area. The immediate objective of this method of attack is partially to denervate the entire area and thus cause a temporary loss of sensation and improve the blood supply to the skin and the cutis of the entire vulval region.

Vulvectomy has been a desperation measure; it is mutilating and commonly results in dyspareunia, tightening of the skin, and ectropion of the mucous membrane of the vagina with subsequent ulceration, excoriation, or fissuring, particularly at the fourchet. It has not accomplished the desired purpose, which is to relieve constant skin and mucous membrane irritation of the entire vulvovaginal area. The author's operation has been devised as a simple surgical procedure to replace vulvectomy and to restore to health the skin of the vulvar area and the mucous membrane of the lower third of the vagina.

Wide plastic undermining of the skin of the vulva, thigh, perineum, and mucous membrane of the vagina offers promise to replace vulvectomy when there is intractable pruritus vulvae of unknown etiology. The surgical phase is not difficult and has not been attended by severe complications of any nature during or after the operation. The results in 16 cases to

date have been very excellent. There was 1 failure, but otherwise no recurrences of skin sensations, ulceration, or excoriation have been reported. The general mental and physical state of these 16 patients has greatly improved.

This operation should be considered only when more conservative measures have consistently failed to alleviate or correct constant continuous pruritus vulvae. Fifteen of 16 patients have had an excellent result to date, some as long as 5 years.

JOHN R. WOLFF, M.D.

MISCELLANEOUS

Cytologic Demonstration of Estrogenic Function in Aged Women with Benign and Malignant Proliferations of the Genital System (Ueber den zytologischen Nachweis oestrogener Funktion bei alten Frauen mit gut- und boesartigen Proliferationen am Genitalsystem). HERBERT HUBER und GERHARD BESSERER. *Geburtsh. & Frauenh.*, 1952, 12: 708.

The authors differentiate between two groups of malignancies in the genital system. The first group includes carcinoma of the vulva, the vagina, and the portio. In this group local irritation plays an important role; the tumors often originate from condylomas, papillomas, leucoplakias, luetic ulcers, or chronic vulvitis. The second group includes malignancies of the cervix, corpus uteri, and the ovary; these are systemic disturbances in which local irritation does not play a role. Multiplicity of the tumors, bilateral carcinoma of the ovaries or tubes, combination of ovary and uterus carcinoma, and the combination of malignant with benign proliferations, as polyps of the cervix and the corpus, are frequently observed. Often these multicentric proliferations appear in the form of a "rejuvenation" of the mucosa of the tubes and the cervix which fail to show the normal atrophy of the menopausal period. These morphologic and functional changes indicate that a hormonal factor is operative in the pathogenesis of "systemic" carcinoma.

The authors were able to demonstrate the action of an estrogenic factor by the cytologic method of Papanicolaou and Traut. These workers proved experimentally that, under the influence of follicle hormone, acidophil karyopyknotic epithelia are found in the vaginal smear.

In the present article the authors showed that the cytologic method is valuable not only for the demonstration of tumor cells but also as a test method for the presence of an estrogenic factor in tumors of the genital system after the menopause. The action of follicle hormone was assumed when acidophil karyopycnotic epithelia were present either exclusively or in more than 50 per cent of the cells.

In a series of 52 patients in the menopausal age period with carcinoma of the ovary, uterus, or both, 47 showed various degrees of follicle hormone effect in the cytologic examination of the vaginal smear. Eighteen of the patients were between 2 and 10 years, and 34 were more than 10 years past the menopause.

Three of the cases are discussed in detail. Of especial interest was the case of a woman of 74 years with a carcinoma of the ovary. The histologic examination of the cervix and the tubes showed marked proliferation of the mucosa, and the cytologic examination of the vaginal smear showed typical signs of estrogenic function. Eight weeks after the operation no signs of hormonal activity could be found in the smear. The cytologic as well as the histologic findings confirmed the theory that an estrogenic factor is operative in the pathogenesis of systemic carcinoma of the genital tract.

The same seems to be true also for benign proliferations. In a series of 77 cases of elderly women with polyps of the corpus or of the cervix, or with benign ovarian tumors, the vaginal smear was positive in 61 cases.

In contrast to these findings, the smear was always negative in secondary metastatic genital tumors and in extragenital conditions which clinically gave the picture of tumors of the genital tract. The authors emphasize the differential diagnostic importance of the cytologic examination in such doubtful cases. WERNER M. SOLMITZ, M.D.

Thrombophlebitis and Thromboembolism. Clinical Considerations with Special Regard to the Instances of Pulmonary Embolism and for any Thrombogenic Action of the Antibiotics (Tromboflebiti e tromboembolie. Considerazioni cliniche, con speciale riguardo ai casi di embolia polmonare e all'eventuale azione trombogena degli antibiotici). PIETRO ALFIERI. *Minerva gin.*, Tor., 1952, 4: 277.

In 1950 and 1951 there were 29 instances of thrombophlebitis (17 cases) and thromboembolism (12 cases) in the Division of Obstetrics and Gynecology of the Maggiore Hospital of Bergamo, Italy. This number corresponds to 0.7 per cent of the total number of cases received. During the preceding years (1942 to 1949) there were 56 cases (42 of thrombophlebitis and 14 of thromboembolism), or 0.36 per cent of the patients received in these two departments of the hospital.

On the basis of the author's own personal experience during the past 2 years, this thrombotic condition has appeared with much greater frequency in the gynecologic laparotomies than in the puerperium, in a ratio of 1.66 to 0.88 per cent. In the gynecologic material the majority of the patients have suffered from the thromboembolic form, while in the obstetrical material thrombophlebitis has prevailed with the classic manifestations of "phlegmasia alba dolens." The latter condition has been about equally divided between the operative and the spontaneous deliveries.

Clinical studies were undertaken by the author with the aim of determining if the increase in the

incidence of thrombophlebitis and thromboembolism for the past 2 years might not be the result of the vastly increased treatment of these patients with antibiotic preparations; however, he believes that the question will have to remain an open one until a much more extensive experience in this matter has been acquired.

In turning to the matter of treatment, the author gives special attention to the major pulmonary embolisms (as distinguished from the lesser embolic processes which are manifested by the fleeting symptomatology known as pulmonary infarction). In the 10 years here considered, 1942 to 1952, 9 such instances were observed. The 3 instances occurring in the 7 years from 1942 to 1949 proved fatal. Of the 6 patients observed during the past 2 years, 4 died. This represents 23.5 per cent of the total mortality for the 2 years, and 50 per cent of the total mortality for the postoperative gynecological operations. The remaining 2 patients, under early and vigorous treatment with heparin, antispasmodics, and sedatives (eupaverin and morphine) in large dosages, recovered in dramatic fashion.

In 2 of the patients who died of their massive pulmonary embolism the catastrophic episode was not preceded by premonitory symptoms; however, in the other 5 patients such symptoms (ill-being, restlessness, tachycardia, febriculae) were present frequently for hours and even days before the onset of the embolic process, and the author wonders whether some of the patients might have been saved if these warning signs had been given greater heed and the patient kept at absolute rest, or if, with the onset of the final episode, the circumstances had been rightly appreciated and a more rational therapy had been instituted (these cases were usually diagnosed clinically as cardiac failure).

With reference to prophylactic therapy of pulmonary embolism, it seems indicated that in instances in which there is known to be a tendency toward the development of thrombophlebitis or of phlebothrombosis, anticoagulants should be administered together with any antibiotic therapy which may be instituted. JOHN W. BRENNAN, M.D.

Study of the Hemostatic Mechanism in Functional Uterine Bleeding of Puberty (Studio dell'emostasi nelle metrorragie funzionali della pubertà). UGO CIULLA and VITTORIO ROGNONI. *Ann. ostet. gin.*, 1952, 74: 116.

Thirty-one patients ranging from 12 to 19 years in age and with a diagnosis of menometrorrhagia were subjected to the following laboratory tests: (1) prothrombin time, (2) coagulation time by the Howell and the Lee-White methods, (3) platelet count, (4) platelet agglutination, (5) heparin titer, (6) bleeding time, (7) capillary fragility, and (8) clot retraction.

Four patients (12.4%) showed increased capillary fragility. After injections of a vitamin P (citroflavin) preparation for 8 to 14 days the uterine bleeding reverted to a normal menstrual flow. In 3 patients an increased heparin titer was demonstrated. These patients received daily intravenous injections of a 1 per cent solution of protamine sulfate for 3 to 6 days. Uterine bleeding diminished promptly with simultaneous, return to normal values of the heparin titer.

All the other laboratory determinations were found to be within normal limits in these patients. HERBERT TEICHNER, M.D.

Treatment of Endometriosis and Other Gynecologic Conditions with Large Doses of Estrogens. LEWIS M. HURXTHAL and ANNE T. SMITH. *N. England J. M.*, 1952, 247: 339.

The authors report further experiences with estrogens, both in endometriosis and other conditions.

Rather large doses were used in 25 cases in which endometriosis was thought to be present or verified. Temporary relief was obtained in many. Of 7 patients in whom treatment was stopped, 4 failed to gain relief from pain, 1 developed swollen labia, 1 developed marked fluid retention presumably because of congestive heart failure, and 1 developed psychotic symptoms.

Stilbestrol was used with satisfactory results in 8 cases of menorrhagia with or without fibroids and in 2 cases of chronic cystic mastitis.

The authors state that stilbestrol may be useful in the treatment of endometriosis but that its usefulness is limited because of its unpleasant side effects or unpleasant complications. In a few cases the results were most satisfactory.

The authors also state that they do not believe cancer of the breast is caused by stilbestrol, but if a carcinoma is present and too small to be recognized during clinical examination its growth may in some cases be accelerated.

Stilbestrol or other estrogens are useful in the temporary management of excessive uterine bleeding but probably should not be employed for an extended time in any case in which a definite history of carcinoma is obtained.

The nodules of cystic mastitis and uterine fibroids may be decreased in size following the use of estrogens, but this needs further clinical study.

Several patients became pregnant while on stilbestrol therapy. The libido was increased in 6 patients. BYFORD F. HESKETT, M.D.

Postoperative Mortality in Gynecologic Surgery. DONALD A. DALLAS. *Tr. Pacific Coast Soc. Obst.*, 1951, 19: 104.

This study of postoperative mortality in gynecologic surgery was accomplished at the Stanford Gynecological Service of the San Francisco City and County Hospital from 1932 to 1949. During this 18 year period 11,323 patients were admitted. Surgical procedures were carried out on 4,769 patients. Fifty-three of these patients died prior to discharge from the hospital and it is with this group that the report is concerned.

Uterine curettage was performed 2,404 times. In this group 1,794 patients were curetted because

of complications of early pregnancy, notably incomplete abortions. Five of these patients died, a mortality of 0.28 per cent. Diagnostic curettage was done 550 times, with a mortality of 0.73 per cent. None of these 4 patients died of causes attributable to the surgical procedure. There was no mortality associated with 39 curettements performed for puerperal hemorrhage.

One thousand hysterectomies were performed; 687 were of the subtotal variety with a mortality rate of 1.16 per cent. There were 259 total abdominal hysterectomies with a mortality of 1.54 per cent, and 54 vaginal hysterectomies with a mortality of 5.5. per cent.

One hundred and thirty operations for ectopic pregnancy were performed with 1 death (0.77%). Salpingectomy for inflammation was performed 90 times without a death. Benign ovarian tumors were removed surgically 123 times with a mortality of 1.6 per cent. There was an operative mortality rate of 43.3 per cent in 30 laparotomies for malignant ovarian tumors, and 169 patients were operated upon for cystocele and rectocele without a fatality. Posterior colpotomy, for draining pelvic abscesses, was done 85 times with a mortality of 4.7 per cent. Seventy-two instances of cervical cauterization yielded a death rate of 1.4 per cent; 48 nephrectomies were done with 2 deaths, and 9 nephrotomies with 3 deaths. Two instrumental perforations of the uteri resulted in 1 death. Several miscellaneous procedures with no mortality were also listed.

Of the 53 deaths prior to discharge from the hospital, 16 occurred in patients upon whom elective procedures were carried out. The histories of each with the author's criticism are presented. In 1 instance the primary cause of death was curare and, therefore, this was considered an anesthetic death. Of the remaining 15 deaths, the usual criticism was faulty diagnosis, poor clinical judgment, poor preoperative work-up, and at times "questionable operative skill." Eight of the deaths in the group were considered to have been preventable.

In conclusion, the author states that the postoperative gynecological mortality is markedly affected by the quality of the preoperative work-up, and he emphasizes the importance of an increasing accuracy of diagnosis, improved clinical judgment, and improved preoperative treatment.

A. L. HASKINS, M.D.

Simultaneous Implantation of Both Fistulous Ureters into the Bladder. (Einzeitige Implantation der beiden fistulösen Harnleiter in die Blase). KARL EHRHARDT. *Geburtsch. & Frauenh.*, 1952, 12: 810.

The author presents the case of a 35 year old multiparous woman who was delivered of a large stillborn infant at home. Four days later urinary leakage was noted. With the use of methylene blue as a contrast fluid, roentgenography and cystoscopy demonstrated a large vesicovaginal fistula on the right and a ureterocervical fistula on the left.

After several months the vesicovaginal fistula was repaired, and several months later both ureters were simultaneously implanted into the bladder. More than 2 years after the operation, the patient was doing well with both ureters functioning.

So far as could be determined, only about 20 cases of simultaneous bilateral ureteral implantation have been reported and even some of these are doubtful. The dangers are ascending infection, periureteritis, fixation, and stenosis. In the case under discussion the procedure was made more difficult because of a previous plastic operation plus the fact that the woman was fairly young and it was deemed advisable to leave the adnexa in place. To overcome the effects of possible postoperative edema the author inserted a ureteral catheter on both sides postoperatively.

WARREN R. LANG, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Clinical Considerations with Reference to Ectopic Pregnancy (Considerazioni cliniche sulla gravidanza ectopica). PIERO BAILO and PEOLO TOSCHI. *Q. Clin. Ostet. Gin.*, 1952, 7: 197.

Two hundred and sixty-eight cases of extrauterine pregnancy were found among 33,827 patients received at the Obstetrico-Gynecological Division of the Maggiore Hospital in Bergamo, Italy, during the 20 years from April 1931 to March 1951. This number of ectopic pregnancies thus comprised 0.79 per cent of the total material. The greatest number of instances occurred in the middle years of the woman's sexual life (30 to 35 years), all but 4.49 per cent occurred in married women, and 77.90 per cent occurred in pluriparas. In 90 per cent of this group the menstrual manifestations did not differ noticeably from the normal.

As to the cause of the ectopic pregnancies, inflammatory processes seemed to be pretty well ruled out in the greater part of this material. Most notable in this regard has been the constancy of the incidence of ectopic pregnancy despite the enormous drop in venereal disease during the past 10 to 15 years. In 27.10 per cent of the ectopic pregnancies there had been previous pregnancies which were interrupted by abortions; this event is interpreted by the author as suggesting a predisposition to extrauterine pregnancy of congenital character (Caffarotto). In the authors' material the ectopic pregnancy recurred in 4.85 per cent; in 50 per cent of these cases the recurrence developed more than 6 years after the first episode; in 70 per cent of these recurrent episodes there was no evidence of past inflammatory processes.

Eighty-seven per cent of the authors' material evidenced menstrual irregularities; these included menstrual delay in 67.49 per cent, menstrual anticipation in 16.67 per cent, and scanty menstrual flow in 2.84 per cent. Abdominal pain occurred in 81 per cent of the cases; this pain preceded the bleeding in 13.90 per cent of the cases, followed the bleeding in 30.80 per cent, and was simultaneous in 65.26 per cent. These figures seem of significance in the diagnosis of doubtful instances. Pain and tenderness in the posterior vaginal fornix was observed in 71 per cent of the cases. In all of these cases there was evidence of bleeding or discharge in the pouch of Douglas. In 98.71 per cent of the 78 patients in whom the puncture of the posterior fornix was done blood was obtained. In this connection it is well to remember that blood may be aspirated from the pouch of Douglas also in instances of ruptured graafian follicle. Quite pathognomonic is the finding of tumefaction of the adnexae. Such swellings were encountered in 60.34 per cent of the author's material; in 47.80 per cent the swelling was on the right side and in 52.2 per cent on the left. A sign of especial significance in the authors' opinion is the shift in the position of the uterus, particularly in an upward and forward direction; in 10.34 per cent of instances the uterus was retroposed, in 28.27 per cent it was anteposed and elevated, and in 7.58 per cent it was lateroposed or lateroverted.

In this material the treatment was surgical; in only 13 instances was colpotomy or medical measures deemed sufficient. The total mortality was 4.47 per cent; from 1931 to 1942 the mortality was 6.60 per cent and from 1942 to 1951 it was 3.08 per cent. This improvement in mortality is ascribed to the improved technique of the obstetrician with more rapid hospitalization and to the extension of indications for blood transfusion, as well as, of course, the introduction of the chemotherapeutic and antibiotic measures. JOHN W. BRENNAN, M.D.

Spontaneous Rupture of the Esophagus in a Pregnant Woman (Sobre un caso de rotura espontanea de esofago en una embarazada). ALFREDO J. GUIROY, SAMUEL CASTRO, ALFREDO A. CORDES, EUGENIO KOREMBLIT, and GRATO E. BUR. *Bol. Soc. obst. Gin. B. Aires*, 1952, 31: 153.

Spontaneous rupture of the esophagus is a very rare accident. The authors present a case in a 19 year old pregnant woman at full term. For 3 days before admission the patient had had headaches and paresis of the left leg. Then she had a sudden loss of consciousness accompanied by tonic convulsions. She later became conscious but still had a left hemiparesis. The spinal fluid showed an albuminocytologic dissociation and was xanthochromic. The ophthalmologic examination revealed nothing significant. A tentative diagnosis of cerebral hemorrhage was made and the patient was treated with papaverine and magnesium sulfate. She died twenty-four hours after admission. Autopsy showed a subpial hematoma in the left rolandic region and a hemothorax of about 800 c.c. There was an elliptical perforation of the esophagus, parallel to its long axis, at about the level of the cardia and approximately 5 by 1 cm. in size. A hemorrhagic area was found in the basal nuclei at about the level of the formation of the pyramidal tracts.

In their discussion of the case the authors bring out the possible relationship between the hemorrhagic area in the diencephalon and the ulcerated lesion in the esophagus. That a cause and effect relationship might exist between such lesions was first pointed out by Rokitansky, and later investigated by many others. Cushing adduced experimental proof of such theories by reporting cases of perforating lesions of the upper gastrointestinal tract following surgery on the brain. In fact, he suggested the presence of a parasympathetic center in the diencephalon, located probably in the tuber cinereum and connected to the autonomic centers in the

mesencephalon and the spinal cord, especially those in connection with the vagus. He showed that experimental lesions involving any of these tracts tend to give rise to ulcers and perforations either in the esophagus or the stomach. The authors therefore conclude that in the present case the patient primarily had a cerebral hemorrhage, which was responsible for the ulceration and the subsequent perforation of the esophagus.

RANES C. CHAKRAVORTY, M.D.

Heart Disease as a Complicating Factor in Pregnancy. FRANKLIN C. MASSEY. *Am. J. Obst.*, 1952, 64: 607.

Although heart disease is a complication in only about 2 per cent of pregnancies its mortality rate of 500 per cent above that of noncardiac pregnancies stresses its importance. Ninety-five per cent of these cardiac parturients have rheumatic heart disease, 2 per cent congenital anomalies, and all other types account for the remaining 3 per cent.

Pregnancy adversely affects the cardiovascular load because the physiological changes during gestation lead to blood volume increase, an accelerated rate of blood flow, and a rise in the cardiac output. Maximum augmentations are reached during the eighth and ninth lunar months and are followed by decreases prior to term. These features predispose toward cardiac failure, tolerated admirably by the normal heart, but poorly borne by the diseased heart. The stresses of labor are well tolerated.

Evidence pointing toward heart disease during pregnancy may be difficult to obtain and its interpretation is problematical. The need of correlation of all data is obvious. The most important signs indicating heart disease are the presence of a diastolic murmur, definite cardiac enlargement, or both.

Prognostication in the pregnant cardiac is difficult and filled with "unknowns." There is no satisfactory method for measuring cardiac reserve in a given patient. Under the classification of the New York Heart Association those in classes 1 and 2 may be considered as favorable while those in classes 3 and 4 are unfavorable.

The management of a cardiac who is pregnant demands the utmost co-operation between the obstetrician and the cardiologist. Heart failure during the first trimester spells either maternal or fetal death. Interruption of the pregnancy as soon as a true effort to control pregnancy has been made is mandatory. Between the third and fifth months the absence of heart failure usually implies an uneventful delivery. Failure during the second trimester also demands termination of the pregnancy. If heart failure occurs during the third trimester the most advisable recourse is to treat the failing heart vigorously and to leave the pregnancy alone.

Vaginal delivery is usually well tolerated and cesarean sections in cardiacs should be done only on pure obstetrical indications. Cardiac care following delivery is most important and must be continued until cardiac reserve is well established.

JOHN R. WOLFF, M.D.

LABOR AND ITS COMPLICATIONS

Breech Deliveries in Private Practice. PHILIP H. ARNOT and DONALD R. NELSON. *Am. J. Obst.*, 1952, 64: 591.

The results in the management of 471 patients who were delivered of 480 infants are presented; 401 were delivered by the senior author.

Although external version of all breech presentations is attempted during pregnancy, the incidence of this presentation in term infants was 3.8 per cent.

Breech delivery is treated in a conservative manner with assistance to the shoulders when necessary, and delivery of the head is aided by the use of suprapubic pressure and the Veit-Smellie-Mauriceau maneuver. Only 9 extractions and 12 destructions per se were necessary in this series. Forceps were applied to the aftercoming head in only 39 instances.

Cesarean section was necessary in 35 women. In the main the indications were pelvic contractions, prolonged labor with no progress, and repeat sections.

The gross fetal mortality rate was 10 per cent (48 infants). Forty-three of these infants were eliminated because of nonviability, maceration and congenital defects, placental separation, prolapsed cord, intrapartum infection, eclampsia and pre-eclampsia, and placenta previa.

The corrected fetal mortality (5 infants) was 1.04 per cent. JOHN R. WOLFF, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Cushing's Syndrome Due to Adrenocortical Adenoma. G. D. OPPENHEIMER, J. L. GABRILOVE, M. VOLTERRA, and H. A. LEAR. *J. Urol.*, Balt., 1952, 68: 547.

The authors report a case of Cushing's syndrome due to an adrenocortical adenoma.

A 26 year old white female was admitted to the Mt. Sinai Hospital, New York, in December, 1947 with severe back pain. Several similar episodes had occurred previously, accompanied by a snapping noise in the back. Amenorrhea had been present for 2 years. Physical examination revealed a moonlike facies plus obesity, and mild hypertrichosis of the lip and cheeks. The teeth were poor and there were tender areas over the ribs. Purple striae were present over the breasts, abdomen, and thighs. The genitalia were negative. A marked kyphoscoliosis and tenderness over the lower thoracic spine were present. The blood chemistries were essentially negative, except for an elevated alkaline phosphatase of 39 King-Armstrong units. The glucose tolerance curve was diabetic in nature and the urinary neutral 17-ketosteroids were within normal range. The basal metabolism rate was minus 34 per cent. A generalized osteoporosis was seen with 53 fractures of the ribs and sternum, plus compression fractures of all the lumbar and several of the thoracic vertebrae. Excretory urograms and perirenal air insufflation were normal. A diagnosis of diffuse bilateral cortical hyperplasia was made. Androgens were given with no results and an increase in osteoporosis was seen; exploration was advised. An arbitrary left adrenal exploration was done. Only a thin rim of adrenal tissue was found; it was left undisturbed. The wound gaped and took about 4 months to heal.

Three months later, with preoperative preparation of cortical extract, a right renal tumor, 3 cm. in diameter, was removed. Microscopically, the tumor was an adenoma of the cortex. Postoperatively, there was a marked state of shock. The blood pressure rose somewhat with vigorous treatment, but the next few weeks were stormy. Adrenocortical extract was given. The wound healed by secondary intention after many months and a phlebothrombosis of the inferior vena cava developed. Sixteen months postoperatively the patient was in good health and asymptomatic. The blood chemistry had returned to normal.

In the discussion, the authors stated they had noted in the literature that Cushing's syndrome may occur with basophilic pituitary adenomas, tumors of the thymus, tumors or hyperplasia of the adrenal cortex, other types of pituitary tumors, or even "arrhenoblastomas" of the ovary. It has been noted that in most cases of Cushing's syndrome, whatever the obvious cause, an increased secretion of adrenocorticotropin is present. In general, the adrenal cortex produces at least 3 types of hormones; a salt-retaining hormone resembling desoxycorticosterone, glycogenic corticosteroids of the type of compound F, and a group of sexogens. Overproduction of any group of steroids results in a characteristic syndrome. Excessive glycogenic corticoids are associated with the syndrome under discussion. It is now known that many of the manifestations of Cushing's syndrome result from the nitrogen wastage present and can be produced in the normal subject by administering compound E.

Diagnosis can be made from a level of increased urinary 11-oxycorticoids and a positive salt-tolerance test. Proper therapy depends, of course, upon the pathological lesions. The presence of a tumor may be determined more easily by perirenal air insufflation in conjunction with laminography. A second aid is the 24 hour level of neutral 17-ketosteroids. Frequently, exploration must be done to exclude the presence of a tumor, and it should be noted that the presence of an adrenal tumor usually causes atrophy of the contralateral gland. The prognosis of benign surgical lesions may be good, depending to a great extent on the preoperative and postoperative management; the outlook for patients with malignant lesions is poor. The use of compound E and adrenocorticotropin is making surgery for these benign tumors more safe and practical. NATHAN ROSENBLOOM, M.D.

Peripelvic Renal Lipomatosis (Sulla lipomatosi renale peripelvica). GIORGIO COSENTINO. *Arch. ital. urol.*, 1951–1952, 25: 434.

One instance of peripelvic renal lipomatosis is reported. About 50 cases of disease of this nature have appeared in the medical literature. The present case was that of a 51 year old male who had contracted gonorrhea when 23 years of age and since then had constantly suffered from a turbid urine (3-glass test); however, at present the only organisms which could be recovered were gram-negative diplococci. He had married at 40 years of age and had two healthy sons. The patient's family showed a tendency towards urinary lithiasis and the patient himself began, 13 years previously, to suffer from intermittent attacks of renal pains, radiating at times to the genitalia and thigh, and rarely accompanied by slight attacks of fever and nocturnal sweats.

Roentgenologic examination at different times disclosed the presence of a urinary stone in the left pelvis and apparently some enlargement of that kidney. The condition was diagnosed as left-sided lithiasis of the kidney and hydropyonephrosis.

Operation (nephrectomy) disclosed the urinary stone and a somewhat enlarged, mildly deformed kidney. There was a large orange-sized mass in the region of the left hilus. This mass was well encapsu-

lated, of firm elastic consistency, and of a grayish-yellow color. It was found histologically to be formed of adipose tissue, intersected by a fine striation of grayish connective tissue. This mass of fatty tissue completely filled the renal hilus, dilating and thinning the kidney parenchyma and enclosing the renal pelvis. The pelvis, in addition to the presence of the pigeon egg-sized calculus, was dilated and showed evidence of inflammation in its walls.

The author believes that this report of an early stage of peripelvic renal lipomatosis—paranephritis lipomatosis, lipoma diffusum renis, substitutio renis adipose, lipomatosis renale, adipose transformation of the kidney—in a patient with a tendency towards the formation of lipomas (the patient had also a small lipoma over the right mastoid region) is of value as it supports the theories of causation which have reference to an irritative factor rather than the theory of a substitution factor (whereby the fatty tissue was merely a substitutional hyperplasia to fill in the vacancy in the kidney bed resulting from a primary atrophy of the kidney itself) as the cause of the condition. This case also evidently supports the theory of the neoplastic nature of the condition. JOHN W. BRENNAN, M.D.

Primary Megaloureter. MEREDITH CAMPBELL. *J. Urol.*, Balt., 1952, 68: 584.

Primary megaloureter is characterized by (1) a relaxed immobile ureteral orifice, (2) altered ureteral dynamics, (3) wide ureteral dilatation which is predominantly lateral with little or no ureteral lengthening or kinking, (4) free vesicoureteral reflux, and (5) the absence of obstruction, neuromuscular vesical disease, or advanced infection. Many so-called cases in the literature do not stand critical analysis in the light of these standards. In several hundred personal examinations on children with dilated ureters, the author found only 2 cases which warranted the diagnosis of congenital ureteral atony; all other cases presented other diseases or factors.

Some nine theories have been given for the cause of megaloureter, as summarized by Hinman. Some of the theories would function in isolated series and types of ureteral dilatations, including fetal persistence of a large ureter, inflammatory changes, and obstruction. Recently, Swenson and his coworkers observed that the probable cause of Hirschsprung's disease (congenital magacolon) is the congenital absence of parasympathetic ganglion cells in the constricted nonperistaltic bowel segment. Since the lower bowel and bladder have a common parasympathetic innervation, it is noted that in half of the cases of Hirschsprung's disease, vesical dysfunction is present. In a histologic study of the bladder wall, Swenson showed a striking diminution of ganglion cells. In the normal control bladders, an essentially uniform pattern of ganglion and nerve cell distribution was found. The essential difference in the amount of ganglion cells could readily be identified by several Boston pathologists in 6 of 7 cases. The cells were also less well developed and functionally defective.

The faulty parasympathetic vesical innervation causes poor detrusor function, inadequate neck opening, and possibly diminished ureter contraction. The bladder thus has a residual with an increased water pressure, against which the ureteral peristalsis must function; this causes dilated ureters and pelves. The author believes that megaloureter must always be a collateral manifestation in neuromuscular vesical disease rather than an isolated lesion and that it is not to be confused with those cases of excessive ureteral dilatation consequent to non-neurogenic obstruction or other disease.

The symptoms are usually those of infection or back pressure. The diagnosis is made by urologic examination. Cystometry will confirm the presence of neuromuscular vesical disease.

The use of parasympathomimetic drugs is of little value in this disease. Decompression of the obstruction by cystostomy drainage has produced the most improvement and, the author states, is the only procedure to accomplish this result with any regularity. Cystostomy drainage is continued for 4 to 6 months or longer and is frequently maintained by the child himself. After the cystostomy drainage is discontinued the child is taught to empty the bladder with suprapubic pressure if necessary. Transurethral resection of the bladder neck is used occasionally. Resection of the lower end of the ureter with reimplantation has been done successfully. The author emphasizes the need for free cystostomy drainage to effect regression of the ureteral dilatation. NATHAN ROSENBLOOM, M.D.

Conservative Treatment of Calculi of the Lower Ureter (Zur konservativen Behandlung tiefsitzender Uretersteine). R. MERGET. *Zschr. Urol.*, 1952, 45: 414.

This article deals with calculi located in the lower third of the ureter between the iliac vessels and the vesicoureteral junction. In the management of this condition the following procedures may be utilized: (1) therapy by movement, (2) therapy by drinking, (3) therapy by spasmolytic drugs combined with therapy of movement, (4) a combination of the preceding measures, (5) surgical therapy, and (6) therapy by means of "stonecatching" methods.

The author's main interest here is to describe the therapy with a "Zeiss' loop" as used in Germany since 1938. Zeiss has extracted more than 1,200 stones with his loop catheter, yet his method has not become too popular in Germany, although some German authors have given this instrument appreciative recognition. The principle of the loop is the same as that of the one used by Ellick. If the loop breaks on exertion of pull no harm is done because it indicates that the stone could not be dislodged and delivered, necessitating open intervention per se.

The treatment with forcible pull on the loop catheter is reserved for lower calculi because of the danger of ureteral tear if applied to calculi at a higher

location. Injury to the mucosa, though admitted, is considered negligible. Infection manifested by a rise of temperature may occur but is self-limited without support by drugs. Even an infected ureter will heal after surgical removal of the stone should the endovesical method fail.

The loop can be applied in any case in which the stone is in a place, ready for engagement, i.e., in the lower third of the ureter, irrespective of the size. It should always be tried prior to surgical intervention. There is no contraindication to the use of the loop, especially in patients with a poor general condition, uremia, and bilateral or multiple calculi. The author uses the loop also retrogradely from an open approach, introducing the loop catheter from the ureteral incision, and forms the loop in the bladder in order to withdraw it through the incision. He also uses it when during the operation the stone is not found in its original location.

Early application is indicated in order to save continued pain, prolonged hospitalization, and economic loss to the patient.

No additional technical description is given (because this has been discussed by Zeiss), except that fluoroscopy is frequently used in order to form a loop to "measure." Good x-ray photographs accompany the article. ERNEST BORS, M.D.

BLADDER, URETHRA, AND PENIS

Vesicoureteral Reflux in Paraplegic Patients. E. BORS and A. E. COMARR. *J. Urol.*, Balt., 1952, 68: 691.

A combination of cystometry and concurrent cystography was employed in 238 patients with lesions of the spinal cord. Increments of 70 per cent skiodan were used to fill the bladder. After the introduction of each 50 c.c. a roentgenogram was taken. The patient strained during the exposure of every other film.

Fifty-six patients (23.1 per cent) had ureteral reflux. Sundry aspects of these cases were analyzed in minute detail.

Reflux was more common with cervical and thoracic lesions than with lumbosacral lesions. It occurred almost as frequently with capacities of less than 200 c.c. as with larger bladders. One-half of the cases had normal detrusor tone. Almost one-third of the patients with reflux exhibited normal-appearing ureteral orifices.

Low detrusor values with reflux at minimal volume occurred with almost equal frequency in a small or large bladder and the level of the lesion was irrelevant.

Extrinsic pressure was thought to be an indirect cause of reflux with upper, and a direct cause with lower, motor neuron lesions. Capacity, pressure, and condition of the vesical neck were said to reflect the type of lesion rather than being the causes of the reflux pyelogram. Reflux was altered in only one-fourth of the 24 patients who had transurethral resection of the vesical neck.

Penoscrotal fistula or diverticulum was noted in many of the cases with reflux, but the reflux disappeared in only 2 of the 10 patients whose urethral lesions were corrected. Control of infection seemed to be more important than intervention.

The reflux in 1 case disappeared after complete posterior rhizotomy despite pathologic orifices. This was thought to add support to the neurogenic theory of the cause of reflux.

ORMOND S. CULP, M.D.

Chemical Cystitis. Synthetic Review and Experimental Research (La cistite chimica. Rivista sintetica e ricerche sperimentali.) ENRICO MANETTI. *Urologia*, Treviso, 1952, 19: 3.

The author divides the instances of chemical cystitis, or of chemical substances acting upon the urinary bladder, into two main groups: (1) those cases in which the substance reached the bladder by the descending route, and (2) those in which it arrived by the ascending route (through the urethra). The first group is further divided into two subgroups: (a) those cases in which the substance is introduced from the outside (exogenic), and (b) those in which the substance arises within the organism (catabolic). Finally the exogenic, descending substances are subdivided into those introduced into the body orally and those introduced parenterally.

The author's research concerns only the substances introduced per urethram. The experimental animals were rabbits and the irritative substances chosen were solutions of various concentrations of silver nitrate. In all, 28 rabbits were used, of which 2 served as untreated controls. The remainder were divided into 6 groups.

In the first group (3 animals) 5 c.c. of a 3 per cent silver nitrate solution were injected every 4 days for 3 weeks. A very slight effect was noted. In the second group the same technique was followed, however, 5 per cent solution was used. The classic picture of mild albuminuria, leucocytes, and erythrocytes resulted, and at autopsy there were hypervascularization of the bladder walls with localized patches of necrosis (blackened by deposits of the silver) usually involving predominantly the region of the trigone.

In the third group (4 animals) the same technique was followed; however, the injections were continued indefinitely, usually until the spontaneous death of the animal. In these instances the typical findings were repeated, usually in accentuated form, and there was a tendency toward the development of severe contracted states of the bladder. In 1 instance there was encountered at autopsy a urinary calculus of tricalcium phosphate with traces of carbonate, the whole blackened by the formation of silver proteinate.

In the fourth group (4 animals) the usual technique was followed; however, the injections were given on alternate days. These animals presented early (by the sixth to the eighth day) a loss of weight, severe pollakiuria, pyuria, and mild bleeding. One

of them died on the twelfth day, another on the eighteenth day, and the remaining 2 were sacrificed on the twentieth day.

In the fifth group (3 animals) 5 per cent silver nitrate was given on the alternate days, but the animal was laparotomized and a whole thickness biopsy specimen was removed from the bladder wall. The breach was then closed with catgut and all treatment was stopped. In these animals the biopsy specimen presented the classic picture of chemical cystitis; however, at autopsy (on the twenty-fifth day) there was practically a complete return to health of the bladder mucosa. In 1 animal of this group a calculus was uncovered, the nucleus of which was a strand of catgut including the knot.

In the sixth group (6 animals) the 5 per cent solution was injected daily until the frank development of cystitis, then treatment was stopped. In nearly every instance the bladder finally returned to health.

In general, in all of the animals which survived in these groups there tended to be a complete recovery from the effects of the chemical irritation without severe permanent damage. However, the presence of the two stones, the one with the foreign body nucleus and the other with a nucleus assumed to consist of a deposit of the silver salts on a floccule of mucus, is taken to indicate the importance of the presence of a foreign substance as a cause of urinary calculus. There was no indication in this series of experiments of a tendency toward the formation of chronic cystitis with the formation of leucoplakia, papillomas, or cancer. JOHN W. BRENNAN, M.D.

The Relation of the Preoperative Estimate to the Pathologic Demonstration of the Extent of Vesical Neoplasms. VICTOR F. MARSHALL. *J. Urol.*, Balt., 1952, 68: 714.

In a series of 104 consecutive patients having radical cystectomy, comparison was made between the anticipated preoperative or clinical extent of the carcinoma and the true postoperative or pathologic stage of the disease.

A classification of vesical carcinoma was evolved to indicate the depth of infiltration, the extent of lymph node involvement, and the degree of malignancy as noted histologically. Actually, a dual classification resulted, consisting essentially of 4 stages and 3 grades. Practically every conceivable combination was found in the 104 specimens. These are presented in analytical detail.

When it had been estimated clinically that lesions were relatively superficial, subsequent microscopic examination revealed a 33 per cent error.

When clinical evaluation suggested infiltration more than halfway through the muscularis of the bladder there was 87 per cent accuracy.

Most errors, therefore, were an underestimation of the extent of the tumor. In the entire group, 42 per cent of the neoplasms were in a stage greater than the clinical appraisal, 16 per cent were in a stage less than that anticipated clinically, and 43 per cent were estimated accurately.

When clinical evidence indicated an early stage and biopsy disclosed a high grade of malignancy, the tumors usually proved to be much more extensive than had been anticipated. On the other hand, when biopsy revealed low grade malignancy, the clinical estimation proved to be remarkably accurate.

ORMOND S. CULP, M.D.

Segmental Resection and Radium Implantation in the Treatment of Carcinoma of the Urinary Bladder. MORTON M. KLIGERMAN, JOHN N. ROBINSON, GEORGE W. FISH, and ISABEL DAVID. *J. Urol.*, Balt., 1952, 68: 706.

From 1925 through 1949, 198 patients with carcinoma of the bladder were treated by radium implantation and 149 by segmental resection. The two groups of patients were studied to ascertain which of the methods provided the longest time interval free of disease and to discover indications for each of the therapeutic plans.

All cases were proved by biopsy. Of the patients treated by segmental resection, 46 were considered suitable for palliative therapy and 103 for primary definitive therapy. In the group treated by radium, 91 were classified as suitable for palliative therapy and 107 for definitive therapy.

Any case was deemed a failure when recurrence developed, even though a successful result was obtained by another method.

Clinical arrests at the end of 0 to 5 years were compared in the two therapeutic groups. A higher percentage of patients remained clinically free of vesical carcinoma at each of the time intervals following radium implantation than after segmental resection. This was considered especially significant because radium had been used on the more inaccessible and more invasive tumors.

The authors advise radium as the initial treatment for patients with grade 2 (or more malignant) polypoid, submucosal, nodular, and sessile lesions, except when the neoplasm occurs in the vertex of an extremely thin bladder or when it proves to be adenocarcinoma of the urachus.

The 347 cases of carcinoma of the bladder that comprised the entire study were analyzed further in terms of annual and cumulative survival rates. When compared with a group of 28 untreated cases, the rates indicate unquestionable prolongation of life after treatment regardless of whether it was definitive or merely palliative.

However, when the cumulative survival rates by years were compared with normal life expectancy it was demonstrated clearly that carcinoma of the bladder shortens life in spite of treatment.

ORMOND S. CULP, M.D.

Replacement of Mucous Membrane of the Urinary Bladder with Thick-Split Grafts of Skin. J. W. DRAPER, RICHARD B. STARK, and MICHAEL W. LAU. *Plastic & Reconstr. Surg.*, 1952, 10: 252.

The authors describe a very ingenious method for replacement of the mucous membrane of the urinary

bladder with thick-split grafts of skin. This is purely an experimental observation and the authors definitely state that it is not to be utilized by surgeons on patients with carcinoma of the bladder. They state that this experiment was used primarily for the treatment of multiple benign papillomatosis in man. Four dogs with bladders which had been resurfaced with skin are now receiving betanaphthylamine, a drug known to produce carcinoma in the bladder in approximately 18 to 24 months.

PAUL R. LEBERMAN, M.D.

Urethrography in the Male with a Highly Viscous Water-Soluble Contrast Medium—Umbradil-Viscous U. OLALLO MORALES and RAGNAR ROMANUS. *Acta radiol.*, 1952, Supp. 95.

In this monograph the authors first consider some fundamental physical properties of fluids. The various types of flow and their significance are discussed. An attempt is then made to apply these basic principles to the analysis of normal and abnormal micturition. The influence of urethral strictures and median bar formation on urine flow are considered particularly.

Applying the same basic physical principles, the authors conclude that the ideal contrast medium for retrograde urethrography should have a high viscosity and should mix readily with the fluids present in the urethra. The high pressure and slow rate of flow resulting from the high viscosity would allow the prostatic urethra to be completely visualized. In addition to these factors the substance used for urethrography should be nonirritating, chemically and physically stable, sterilizable, rapidly absorbed, harmless, easily removed from the urinary tract, and should possess a satisfactory contrast density.

The authors report on the use of umbradil-viscous U. It consists of 35 per cent of the diethanolamine salt of 3.5—diiodo-4—pyridine-N.—acetic acid, 3.25 per cent of sodium carboxymethylcellulose, and 0.25 per cent of xylocain. The xylocain is a rapid acting anesthetic agent used to reduce urethral and sphincteric spasm. The iodine content of umbradil is as much as 17 per cent.

In the technique used routinely, a "flat plate" is taken first with the central ray directed 15 degrees caudally. The umbradil-viscous U is then injected manually with a penile clamp aiding in the introduction of the material. Routinely, a frontal view, two oblique views, and a view of contraction and one of attempted micturition are made. Fluoroscopic observation of the membranous and prostatic urethra is routinely made as the patient contracts the pelvic floor, and an exposure is made at the time of maximum contraction.

The results of the studies with umbradil-viscous U are described and illustrated. In 83 studies the urethrogram obtained with this high viscosity medium was compared with urethrograms obtained with low viscosity mediums. In general, the former material was more satisfactory. The authors point out that the density of umbradil-viscous U is such that it is even possible to obtain a satisfactory true lateral view of the urethra. A detailed description of the normal and abnormal findings of urethrography is given.

JOHN T. GRAYHACK, M.D.

Separation of Urethra from Bladder Due to Fracture of Pelvis. H. M. CONSTANTIAN and L. M. FELTON. *J. Urol.*, Balt., 1952, 68: 823.

Crushing injuries resulting in fractures of the pubic rami and separation of the pubic symphysis are likely to be complicated by rupture of the membranous urethra and urinary extravasation. The presence of gross blood at the urethral meatus suggests injury of the lower urinary tract. In extravasation, severe shock is usually present. There may be suprapubic tenderness and fullness or ecchymosis of the abdominal wall, genitalia, and perineum. Rectal examination may reveal displacement of the prostate and an accumulation of blood and urine. After attempted catheterization is unsuccessful, the injection of 15 to 30 c.c. of radiopaque solution will usually establish the diagnosis of rupture of the urethra.

Urinary extravasation resulting from separation of the urinary bladder from the urethra constitutes a surgical emergency. Measures to combat shock must be instituted immediately. As soon as the patient's condition permits, suprapubic exploration should be undertaken. After securing hemostasis, the bladder, if intact, should be opened. A Foley catheter should then be guided through the severed ends of the urethra into the bladder and its balloon inflated. A silk thread is passed through the nose of the catheter and led out of the suprapubic wound. Traction on the catheter approximates the ends of the urethra. The bladder and space of Retzius are drained. The suprapubic drainage should be maintained for 2 to 4 weeks; the urethral catheter should remain in place for 4 to 6 weeks.

The technique described was used to repair urethral injuries in 4 boys from 4 to 13 years of age. In 3 cases a straight catheter with a rubber tissue drain wrapped around the end was used to produce the traction necessary for approximation of the severed urethra. The functional results were uniformly satisfactory.

JOHN T. GRAYHACK, M.D.

GENITAL ORGANS

Thirty Years' Experience with Enucleation of the Prostatic Adenoma—So-Called Prostatic Hypertrophy—by the Ischial Approach. A Critical Discussion of other Approaches to the Prostate Gland (Dreissigaehrige Erfahrung mit der Enukleation des Prostatadenoms—sog. Prostatahypertrophie—auf ischialem Wege. Zugleich eine kritische Auseinandersetzung mit den uebrigen Zugangswegen zur Prostata). OTTO HENNIG. *Zschr. Urol.*, 1952, 45: 347.

Despite the frequency of prostatic hypertrophy, no standardized operation has been devised, and the suprapubic, retropubic, transurethral, and perineal methods are still competing with each other. Among

these the author seems most opposed to the transurethral method for two reasons:

1. He believes that residual urine develops on the basis of neurogenic bladder dysfunction and is caused reflexly by the stimulus of the growing enlargement rather than by mechanical obstruction. Partial resection, therefore, does not cure the residual factor.

2. Estrogenlike substances have been discovered in adenomas, which is a significant indication for complete removal.

Before discussing critically the various methods used, the author reviews in detail the topographic anatomy of the prostatic region. The perineal approach is the shortest, and the suprapubic, the longest, route. Voelcker's posterior approach through the ischial fossa permits the widest exposure of the gland without injury to the vessels or nerves, in contradistinction to the perineal route, which gives the smallest exposure, and the retropubic route which carries the danger of injury to the venous plexus or nerve. Ischial exposure also prevents injury to the sphincters of the vesical neck and to the urethra and affords easy intracapsular enucleation with subsequent control of hemorrhage under direct vision. It makes suture between the urethra and vesical neck unnecessary, which—in the author's opinion—leads frequently to strictures; finally, dependent drainage can be easily achieved, an advantage this procedure shares with the perineal method, contrary to the suprapubic and especially the retropubic operation.

If a standardized technique is used in prostatic surgery the following requirements should be fulfilled: (1) simplicity of the method, not necessitating special instruments, (2) wide, nondangerous exposure permitting easy hemostasis under vision, (3) dependent drainage, (4) avoidance of abdominal incision with its risk of respiratory embarrassment, (5) preservation of the sphincters and suspensory apparatus of the posterior urethra, (6) avoidance of circular sutures around the vesical neck to prevent stricture formation, (7) simple anesthesia, and (8) simple postoperative management.

The suprapubic operation remains the method of choice for intravesical adenomas, whereas the subcervical lesion is attacked retropubicly. The author is opposed to the latter procedure for many reasons. Both the suprapubic and retropubic approaches have the disadvantage of an abdominal incision.

The perineal approach presents the shortest route to the prostate and permits dependent drainage, but it has the disadvantage of a small funnel-shaped exposure with the danger of rectal injury and damage to the sphincters.

The ischial approach (Voelcker's ischiorectal approach), unjustly described as technically difficult, has been improved by the author in the past 30 years so that every surgeon should be able to use it.

Preoperative preparation consists of the changing of the indwelling Foley bag catheter, bladder irrigation, and evacuation of the bowel. Anesthesia is of the epidural type plus local infiltration of the skin and subcutaneous tissue with 1 per cent novocain.

The patient is placed astride, facing the head end of the operating table. He is bent forward with the buttocks pushed over the end of the table; the chest is supported by a round pillow equipped with the inactive electrode. The forehead rests on a hard pillow and the legs are supported by stirrups fastened to the inverted knee-rest poles. The field is draped to leave the anal cleft and the right gluteal region uncovered. The anus is occluded by a sponge fixed by a perianal purse-string suture.

The first phase of the operation consists of a vertical incision made parallel and one fingerbreadth to the right of the anal cleft which extends from the sacrococcygeal junction to the level of the anus and enters the ischial cavity. The skin edges are retracted and hemostasis is secured. The gluteus maximus muscle may have to be incised. The ischial cavity forms a funnel, the medial wall of which is the levator muscle and the lateral wall is formed by the parietal fascia from which the tendinous arc of the levator originates. In tall, slender individuals the levator course is steeper; in short, stocky individuals it is more horizontal. The levator is exposed in its full length by retracting the fatty tissue, the levator fibers are bluntly separated by instruments, and the opening is enlarged by finger dissection. Thus the white visceral fascia is exposed. The right index finger is easily introduced between the visceral fascia and the levator muscle until the prostate can be palpated. Instead of following Voelcker's original procedure to incise sharply and medially to the largest vein of the vesicoprostatic plexus, the author palpates the lateral margin of the prostate, then slides his finger to the apex of the prostate where the catheter can be felt, and eventually to the anterior surface of the prostate. He then pierces bluntly, with his right fingertip, the visceral fascia which is very thin at this place and thus enters the space between the posterior aspect of the prostate and the rectum which remains covered by the visceral fascia. This excludes injury to the rectum. (He has injured the rectum only once when adhesions existed because of a prostatic abscess which had ruptured into the rectum.) Once the fingernail of the index finger touches the posterior surface of the prostate firmly, the line of cleavage is enlarged by sawing movements of the finger. The isolated rectum is then retracted medially. The entire procedure takes ½ or 1 minute, and after completion the exposure is wide enough to permit introduction of a hand.

In the second phase the prostatic capsule is opened by a horizontal incision in the middle of the posterior surface and the nodule is pierced with the right index finger down to the urethra where the catheter is felt. A Young tractor is applied with tension. The line of cleavage between the capsule and the prostate is entered either with a blunt scissors or the index finger, and under visual control the adenoma is mobilized until it is to be severed from the bladder neck. The capsule is kept apart by catgut stay sutures. After the adenoma has been sufficiently mobilized the tractor is removed and traction is applied by

means of a tenaculum. The catheter is withdrawn from the bladder, its tip grasped with a hemostat and led out through the wound. The remaining connections between the adenoma and urethra are severed sharply. Special care must be taken to deliver a middle lobe. The bladder neck is inspected carefully by palpation in order not to overlook nodes and a temporary catgut stay suture is applied to the upper quadrant of the vesical neck to prevent retraction. The bladder can then be inspected for calculi.

In the third phase hemostasis is achieved by compression of the widely open prostatic cavity by means of a large pad. This pad may be saturated with hemostyptic substances (alexan, H202). After it has been slowly removed all remaining bleeding points of the bladder neck are secured by suture ligatures or by fulguration. Thereafter the catheter tip is reintroduced into the bladder. Iodoform packing is used in exceptionally rare cases. The capsule is united by interrupted sutures. The bag of the Foley catheter is inflated. A drain is placed on top of the prostatic capsule and the wound is closed. The prostatic capsule is resected only when histologic examination for possible malignancy is desirable. The entire operation takes routinely 25 to 30 minutes but can become technically difficult after inflammation has occurred or if carcinomatous degeneration is present.

Postoperative treatment consists of irrigation of the bladder before the patient is returned to bed, but thereafter it is used only to keep the catheter patent. The drain is removed on the fourth postoperative day and the catheter between the tenth and fourteenth days. The advantages of the improved Voelcker method are wide exposure permitting working under vision and dependent drainage not necessitating antibiotics and sulfonamides. The prevention of osteitis pubis, incontinence, and permanent urinary fistula is another advantage of the method. Among the reasons why this operation has not become popular are the following:

1. The name "ischiorectal" operation was originally coined by Voelcker. It has now been changed by the author to "ischial" operation. By analogy the perineal would be called the "perineorectal" method because it, too, avoids rectal injury.

2. The original description of a large marginal vein of the vesicoprostatic plexus as a landmark to enter the space between prostate and rectum is fallacious and has led to rectal injuries.

3. Any new method will, at least temporarily, be welcomed with enthusiasm and produce neglect of the older procedures. This was the case with transurethral resections, and is now true for retropubic operations. Considering the increase in longevity, a good method of prostatectomy gains significance in the field of geriatrics. ERNEST BORS, M.D.

Radical Operation for Prostatic Carcinoma (Die Radikaloperation des Prostatakarzinoms). R. UEBELHOER. *Zschr. Urol.*, 1952, 45: 330.

In his introduction the author mentions the beneficial, although limited, value of hormonal therapy for prostatic cancer. While untreated individuals had an average life span of 6 months following the diagnosis, treated patients (300 of a not yet published series) survived with hormonal therapy for an average of 2 years. The author believes that cancer of the prostate lends itself as well, or as poorly, to radical treatment as any other cancer in the body. He mentions the results of permanent cure achieved by the perineal method of Wildbolz and Young and discusses why this method is not used more frequently. One reason is the late detection of prostatic cancer which often develops insidiously and is diagnosed only when routine examinations of the population are carried out. At such an occasion cancer was found 6 times among 1,000 patients. Another reason that perineal prostatectomy is rarely applied is the incidence of incontinence. And the third reason is that few operators are familiar with the technique. Although the author believes that a radical prostatectomy can be carried out suprapubically or retropubically, he thinks that these methods do not permit satisfactory exposure and lead to stricture or incontinence. He presents his sacral method which he has used since 1947 and mentions that a similar, though never published, approach had been used by Hochenegg.

With the patient in left side position, the coccyx is exposed from a curved incision and resected with a chisel. The tissue on the right side of the rectum is severed cranially and the levator is incised caudally. Blunt dissection then separates the rectum from the prostate and seminal vesicles; this dissection is carried to the apex of the prostate and includes the complete mobilization of the seminal vesicles; it is then extended to the left side of the prostate. The prostatic fascia, which varies in its thickness, is incised medianly and reflected laterally. This is done in order to have material for future closure. The vasa are then cut electrically, the seminal vesicles are mobilized and freed on their tips with or without ligation, and the prostate is grasped with a tenaculum and pulled cranially. The apex is then severed from the urethra and with upward pull the anterior aspect of the prostate is exposed and freed until the prostate is only attached to the bladder neck. The pull on the prostate is then reversed caudally and separation from the bladder is started by dissecting the prostate from the trigone and from its attachments to the vesical neck. If the opening in the bladder is small, its full size will be used for anastomosis with the urethra; if it is too large, the posterior circumference will be decreased by a partial purse-string suture. Then suture of the anterior aspect of the vesical neck and urethra is done, the stitches being taken through the extraurethral tissue. A Nelaton catheter, 20–22 Fr., is introduced. The urethra and posterior surface of the bladder neck are approximated without tension and the preserved prostatic fascia covers the remaining defect. A second row of sutures is achieved by taking up the surrounding tissue and a third row is furnished by uniting the severed levator fibers. A drain is intro-

duced through a stabwound to the right of the incision and the skin is closed in two layers. The catheter is removed on the ninth postoperative day.

Among 62 sacral prostatectomies the primary mortality comprised 6 and the late mortality 13 patients; of the latter group, 4 died from intercurrent diseases without evidence of recurrence; 34 patients are alive without recurrence from 6 months to more than 5 years; 9 patients have a recurrence. The operative treatment is combined with hormonal therapy. Each patient receives a hormonal implant prior to surgery and hormones postoperatively for at least 1 year.

Complications are reported: a vesicorectal fistula was observed once (not contained in the presented series). Minor strictures and a tortuous urethra without residual urine are common. Later dilatation may become necessary. Incontinence was observed 10 times, 1 also at night. Five patients wear a urinal; the rest use a pad. One patient sustained a ureteral injury which necessitated re-implantation of the ureter into the bladder and ended in cure.

Three patients are alive without recurrence after more than 5 years. However, the author presents 2 patients who were not operated on radically, but are well at the age of 76 and were observed since the latter part of 1946. In both cases the diagnosis of cancer was histologically confirmed from the tissue obtained by transurethral resection; one patient was treated with hormones, the other with castration; while the latter shows signs of feminization, the other does not. The author presents these 2 cases in order to emphasize that careful selection should be made of the patients for conservative and operative treatments. He believes that sacral operation has the advantage of clear exposure and gives the best results when combined with hormonal therapy.

ERNEST BORS, M.D.

Evaluation of Current Treatment of Prostatic Cancer. HERBERT BRENDLER. *J. Urol.*, Balt., 1952, 68: 734.

Prostatic cancer is the most common malignancy in the aging male. In evaluating the effectiveness of treatment there is a tendency to draw specious conclusions regarding absolute curability from analyses of 5 year series. These studies indicate trends only and can be misleading unless coupled with a thorough knowledge of the natural history of prostatic cancer.

In early cases in which the cancer is limited to the gland itself, treatment is directed toward a cure. Radical perineal excision of the prostate, seminal vesicles, and adjacent bladder neck is the treatment of choice. Unfortunately, the applicability of this operation is low. It is doubtful whether patients over 70 should be subjected to this procedure in view of the limited life expectancy. In most clinics the operation is found applicable in 3 to 5 per cent of the cases, although Jewett's figure is 11.2 per cent. The operative mortality is about 3 per cent. Impotence follows commonly. Urinary incontinence occurs in 12 per cent.

The treatment of occult prostatic cancer discovered in histological examination after simple prostatectomy for apparently benign enlargement has been a subject of debate. The Hinmans, in a 5 year follow-up of 14 such cases after transurethral resection, found that 5 patients subsequently subjected to perineal prostatectomy had an average survival of 67.8 months. The other 9 treated only with transurethral resection survived an average of 36.8 months. Nesbit and Baum, questioning the advisability of radical operation, found 26 of 42 patients with occult prostatic cancer alive and apparently well up to 12 years after the original diagnosis. The author considers occult prostatic cancer simply as a form of early cancer limited to the gland and advocates radical operation. This view is based somewhat on our inability to measure the biological potentialities of the growth and its inherent ability to spread.

The treatment of prostatic cancer which has spread beyond the immediate boundaries of the gland is concerned with: (1) relief of the urinary symptoms and (2) the endocrine control of the tumor. Transurethral resection has been the most widely used method in dealing with obstruction of the bladder neck in these cases. Some urologists have abandoned this procedure in favor of cystostomy in the belief that resection stimulates the growth in residual cancer. In a minority of cases endocrine measures alone are effective in relieving obstructive symptoms. There have been attempts to include within the scope of the radical operation certain cases in which the malignant process seems not to have extended very far beyond the prostate. The operation is stated to be rendered technically feasible after preliminary estrogen treatment which is thought to destroy the malignant cells in the extraprostatic tissue. This supposition is not borne out by histologic study and there is grave doubt concerning the applicability of the radical method in these cases.

There are no records of actual cure with the use of endocrines. Surveys by Nesbit and Baum show an apparent increase in the percentage of 3 and 5 year survivors in endocrine-treated cases when compared to a series of untreated controls. However, the validity of the control series may be challenged on the basis that the patients did not receive the benefit of modern surgery, antibiotics, and improved medical care which favorably influence the course of the disease today irrespective of endocrine care.

It seems evident that endocrine treatment is more complicated than the antiandrogenic concept implies, since relapses inevitably occur during treatment. The tumor may have become "androgen-independent" or insensitive to estrogens. Present studies on the treatment of relapses include bilateral adrenalectomy, pituitary irradiation, the use of progesterone, and work on urethrane, nitrogen mustards, and folic acid derivatives. The stalemate that exists in the treatment of prostatic cancer cannot be resolved until we gain a clearer understanding of the malig-

nant process. We must devote ourselves in increasing measure to basic research in prostatic physiology.
ALLAN K. SWERSIE, M.D.

Progress in Suprapubic Prostatectomy. JOSEPH C. BIRDSALL, GEORGE C. POORE, H. M. BURROS, and D. S. LIANG. *J. Urol.*, Balt., 1952, 68: 729.

The authors compare statistically two series of patients of 27 each. These patients were submitted to suprapubic prostatectomy by urologic residents 13 years apart, in order to show progress in this short time period. The two techniques used have numerous variations although the basic method is the same.

The technique employed in the 1937 to 1938 period involved the use of the bulky Pilcher bag and a large suprapubic drainage tube. After removal of these agents, a urethral catheter was introduced and tied in place. Urethritis, an infected prostatic bed, and epididymitis often followed.

In the 1949 to 1950 period, the bladder was irrigated through a 22 F Foley catheter with a 30 c.c. bag, with a 1:10,000 silver nitrate solution after anesthesia had begun. It was then filled with sterile water. The bladder was approached through the usual median hypogastric incision, emptied by suction, and inspected. The tip of the Foley catheter was grasped with a curved Kelly hemostat, drawn up out of the wound, and held over the symphysis out of the way. The prostate was then enucleated by the Squier method. Rectal counterpressure was used if enucleation was difficult. A sponge on a long forceps was pressed into the prostatic cavity to control bleeding while the bladder neck was inspected. A modified Hartman punch was used to remove any obstructing tissue. An oxycel cone was placed on the catheter and an initial 10 c.c. of water were placed in the bag. After the bag had been drawn into the prostatic fossa an additional 20 c.c. of water was usually added. The bladder was closed from below upward with a No. 1 chromic continuous suture through all layers after placement of an open end Pezzer catheter (22 or 24 F) in the upper end. A drain is placed in the prevesical space. Both the Pezzer catheter and the drain are sutured to the skin. Only such traction is used on the Foley catheter as may be necessary to keep it in the prostatic fossa for control of the bleeding. Four hours postoperatively, traction is released and the bag is deflated to a 5 or 10 c.c. volume. No irrigation is used unless the tubes become blocked. The suprapubic tube and the prevesical drain are removed the following morning. Antibiotics are chosen according to the urine cultures. Ambulation is begun the second or third day.

Comparative statistics are presented. In the early series, the average hospital stay was 53.9 days. The wound was dry on the seventeenth postoperative day (on the average) and the patient voided on the twenty-fifth day. There were 5 cases of epididymitis. In the later series the average hospital stay was 16.7 days, the wound was dry on the second day and the patient voided on the seventh day. There was 1 case of epididymitis.

The improved results are believed to be due to the use of small tubes, earlier release of tension on the urethral bag, earlier removal of all tubes, the use of antibiotics, of the Foley bag, and of oxycel gauze for hemostasis, routine transfusions, and early ambulation.
ALLAN K. SWERSIE, M.D.

Analysis of Results of Prostatic Surgery in 866 Cases. GEORGE BULKLEY and JOHN W. KEARNS. *J. Urol.*, Balt., 1952, 68: 724.

During an 8 year period, 142 patients underwent suprapubic prostatectomy and 632 were treated with 724 transurethral prostatic resections. Mortality in the suprapubic group was 8.5 per cent, while in the transurethral series only 1.4 per cent died.

A high percentage of patients in both clinical groups had associated lesions in other systems as well as additional types of genitourinary abnormalities. These are enumerated in detail.

The complications after each type of operation are listed and discussed briefly. The most serious complications in both groups occurred in the cardiovascular system.

Patients in whom urinary extravasation was recognized and treated promptly had rapid and uneventful recovery.

The initial transurethral resection was incomplete in 58 patients. Any patient who is not urinating freely or completely is re-examined with the resectoscope and residual tissue is removed 1 week after the first procedure.

The authors recommend routine vasectomy to avoid epididymitis and adequate meatotomy to prevent postoperative strictures at the meatus.
ORMOND S. CULP, M.D.

Disturbances in the Descent of the Testicle (Ueber Stoerungen im Descensus des Hodens). WALTER DICK. *Deut. med. Wschr.*, 1952, 77: 1112.

The author discusses the mechanism of the physiologic descent of the testicles and the different forms of disturbances in this process.

Very interesting animal experiments have shown that an intra-abdominal or inguinal testicle is not able to produce viable spermatozoa. When the testicle was transferred into the abdominal cavity spermatogenesis came to a stop, because of degeneration of the germinal epithelium. The process is reversible. When, in the same animal, the testicle was brought back into the scrotum, spermatogenesis was restored. The reason is that the higher temperature inside the abdominal cavity inhibits the development of spermatozoa. When the intra-abdominal testicle was cooled artificially the degeneration of the germinal epithelium did not develop. When, on the other hand, the scrotum of normal animals was wrapped in cotton the animal became sterile; when the cotton wrapping was removed the animal became fertile again. Japanese investigators have shown that, in man, sun irradiation of the scrotum of several hours duration produced temporary sterility; the same effect was produced when

a thermophore was applied to the scrotum. As the author puts it, the scrotum serves as a "cooling unit" for the testicle. This applies to spermatogenesis only; the secretory function of the testicle, which is ascribed to the interstitial cells, is not influenced by its location in the abdominal cavity. Therefore, a man with bilateral cryptorchism may develop all the secondary sex characteristics, including potentia coeundi, but is sterile because of aspermatogenesis.

From these observations, it follows that treatment of intra-abdominal or inguinal testicle before puberty is imperative to ensure fertility. A further reason is the danger of malignant degeneration. The chances that a carcinoma will develop in a dystopic testicle are one-hundred times higher than in a testicle in normal position.

The causes for failure of descent may be either mechanical or hormonal. Very little is known about what causes the testicle to descend in the eighth month of embryonal life; however, it is assumed that the descensus is controlled by the gonadotropic hormone of the anterior pituitary lobe. We know that the testicle is dormant during the first 11 years of life; the testicle of the eleven-year-old boy has the same size as that of a boy one year old. Therefore, hormonal treatment with gonadotropic hormone should be started at the age of 11 only; if, before that time, an inguinal testicle causes discomfort or pain it should be corrected surgically. Five hundred units of gonadotropic hormone are given twice weekly for a period of 6 to 8 weeks; if by this time the testicle has not descended, surgery is indicated. Therapy with testicle hormone is contraindicated. This hormonal therapy should be applied especially in bilateral cryptorchism; if the cryptorchism is unilateral the failure of descent is probably due to a mechanical obstacle.

Surgical correction should be done shortly before the onset of puberty. The author recommends transfer of the testicle into a recess between the tunica dartos and the dermis of the scrotum. The testicle is passed through a gap in the tunica dartos and is held in place as a button.

If the retention is unilateral and it is impossible to bring the testicle down into the scrotum because of shortness of the vessels, then it is preferable to extirpate an atrophic testicle rather than to leave it in place and risk carcinomatous degeneration. In adult age an undescended testicle should be extirpated if the other one is normal because no spermatogenesis can be expected at this time, and because the danger of malignant degeneration is always present. WERNER M. SOLMITZ, M.D.

New Operative Method for the Cure of Subcutaneous, Inguinal, and Abdominal Ectopia of the Testicle (Nuovo metodo operatorio per la cura dell'ectopia sottocutanea, inguinale, addominale del testicolo). GIOVANNI MARIA GUILIANI. *Arch. ital. chir.*, 1952, 75: 253.

In order to bring the ectopic testicle into the scrotum and be able to leave it there freely without any form of fixation, which the author regards as unphysiological, he uses a general technique of freeing the cord as high up as necessary—even exposing the lower pole of the kidney or the great vessels of the midline where the spermatic vessels take origin, and following the vas as far as the seminal vesicles. Even the incision has become fairly well standardized for all cases during the past 16 years during which he has been giving special attention to the subject. At first the midline incision from umbilicus to pubis, then the Pfannenstiel incision, and finally the pararectal was used. In the last-mentioned the initial incision is made over the inguinal canal, just as in the instances of hernia, then is carried up pararectally as high as necessary.

The second general principle involved in the author's method of operating on the ectopic testicle is that of shortening the route traversed by the spermatic cord. This is accomplished in two ways. The first method is employed in the subcutaneous ectopias and other less severe forms in which the cord seems long enough to reach the bottom of the scrotum, after funiculolysis, without tension. This consists essentially in passing the testicle and cord out of the abdomen behind and under the epigastric vessels and then into the scrotum by the usual subcutaneous route.

The second method of shortening the route for the spermatic cord is employed in the more severe forms of intra-abdominal ectopias in which the cord is deemed too short to permit of the testicle's being carried down across the pubic ramus without tension. The so-called perineal route is almost identical with that used by the old-time "stone cutters" in approaching stones in the lower end of the ureter. By this technique the incision is made over the anterior perineal triangle and carried down to the urogenital triangle. This structure is then pierced by blunt dissection into the space anterior and lateral to the bladder. The spermatic cord and testicle, following funiculolysis, is then passed behind and beneath the pubic arch and brought out on the surface of the perineum, lateral to the midline, and a good 2 cm. beneath the pubic arch. The scrotum is now incised and a forceps (blunt dissection) passed upward and laterally to grasp the cut end of the gubernaculum and the testicle is drawn gently down into the scrotum.

With reference to the results in general, the author believes that his own previously published results and the enthusiasm of other authors who have used his methods are sufficient evidence of their efficacy. For the last-mentioned perineal technique, however, the author has only his own results to offer, since he is the only person, so far as he knows, who has used the method.

His perineal material consists of 11 patients (14 testicles) with 9 per cent failure, as reported in 1949; this figure has since, however, been augmented to 15 per cent if one considers that 2 of the 14 testicles have disappeared from the scrotum and 1 has become atrophic. In the latter instance, however, the

organ was atrophic before the operation was undertaken and it is thought that the same disturbance of development which originally resulted in the failure of descent of the organ might have been to blame. The author is certain that in this instance the cord did not suffer injury during the funiculolysis; there was no gross injury to the blood or nerve supply of the testicle. Nevertheless, he is of the opinion that a more thorough study should be made of the anatomy of the structures involved, in order to determine if there might not be produced some lesion of the sympathetic nerve supply, resulting in trophic disturbances of the transposed testicle.

JOHN W. BRENNAN, M.D.

MISCELLANEOUS

Differential Absorption of Electrolytes from the Large Bowel in Relation to Ureterosigmoid Anastomosis. D. ANNIS and M. K. ALEXANDER. *Lancet*, Lond., 1952, 263: 603.

This is a timely subject and most urologists who have done ureterosigmoidostomy have only recently recognized the complication of hyperchloremic acidosis. Ferris and Odel were the first, in 1950, who gave a probable answer for this phenomenon, although Boyd reported this condition in 1931.

In giving an explanation for the development of hyperchloremic acidosis in patients, attention has been mainly directed to the factors of impaired renal function and the absorption of urinary constituents from the bowel. The authors studied 2 patients in whom a healthy sigmoid colon and rectum had been isolated from the rest of the bowel in order to observe the fate of various constituents of the urine instilled into the isolated loops. They report their results as follows:

In 1 case both saline solutions with urine showed that there was comparatively little change in volume for 3 hours in the isolated bowel. On 5 occasions 150 ml. of fluid were introduced and the average recovery was 147 ml. with a range of from 125 to 170 ml. Within the error of the method these variations cannot be considered significant.

In the other case, in which a precise estimate of the volume change was possible, 100 per cent of the introduced fluid was recovered. In the experiments in which 150 ml. of water were introduced, however, it was seen that at the end of 3 hours the bulk of the water had been absorbed.

In 5 experiments with urine introduced at acid *p*H between 4.9 and 5.4 there was a striking change to an alkaline reaction (*p*H 7.2 to 7.6) despite the known powerful buffering properties of urine.

The authors conclude that in all the experiments with urine there was an absorption of chloride in large excess of that of sodium. In 1 experiment there was no appreciable change in the potassium concentrations. In 2 experiments the concentration rose from 21 to 24 mEq. and from 33 to 44 mEq., respectively. The bicarbonate content of the acid urine instilled was not more than 1 mEq. per liter. The fluids withdrawn contained 27 and 8 mEq. per liter. Ammonia, estimated in only 2 of the experiments, showed the following: conflicting results in the concentration changes. In the first experiment there was an increase of 32 mgm. per 100 ml., and in the second a decrease of 61 mgm. per 100 ml.

Information as to urea concentration showed a striking decrease in concentration, in 1 experiment from 1,700 to 400 mgm. per 100 ml. and in the other from 2,400 to 1,200 mgm. per 100 ml. The uric acid showed no appreciable change in concentration.

In summarizing their work the authors state that changes in the constituents of the urine in saline solutions instilled in these segments of bowel showed a greater absorption of chloride than of sodium, and changes in these and other constituents.

The authors suggest that the reader review an article by J. Lapides for an illuminating experiment (*Surg. Gyn. Obst.*, 1951, 93: 691).

PAUL R. LEBERMAN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Neck and Shoulder Pain Syndromes. Louis G. Howard. *Med. Clin. N. America*, 1952, 36: 1289.

The authors review the more common causes of neck and shoulder pain, as well as their diagnosis and treatment. Anatomically, the seven cervical vertebrae are maintained in mobile relation with one another by ligaments and by muscles from the cervical spine to the shoulder girdle, from the skull to the cervical spine and from the skull to the shoulder girdle. There is no intervertebral disc between the skull and C 1 or between C 1 and 2. However, nerve roots come out of all lateral intervertebral foramina and between C 1 and the skull. Usually the brachial plexus comprises the nerve roots of C 5 to T 1, inclusive. Lesions in the shoulder may refer pain to the neck. Lesions in the neck may refer pain to the shoulder, and pathologic conditions in either area may institute purely local pain.

Tumors within the cervical spinal canal result in pain of a segmental distribution. Tumors or disease within the spinal cord itself may produce bizarre symptoms which, however, are also segmental in distribution. A tumor in the lower half of the cervical spine may produce a brachial neuritis with reference of the pain to the base of the neck, out over the shoulder, or down the arm and forearm to the hand and fingers. Muscular atrophy may be present. Muscular fibrillation frequently is found. Reflex changes are common and pain reflexes are common and often confusing. A careful history, a painstaking neurological examination, and pantopaque myelography will almost always determine the presence of a cord tumor.

Degeneration of an intervertebral disc in the cervical spine is common and occurs most frequently in the lower half. Disc degeneration and subsequent vertical thinning permit nerve root pressure which may cause local neck pain. However, the pain may be referred segmentally to the shoulder and arm or to the interscapular area. Pain may be increased by downward vertical pressure upon the skull; therefore head traction gives great relief and is a major aid in the treatment as well as in the diagnosis.

Cancer of the cervical spine may cause death if high enough to interfere with respiration. In the lower half it may produce a brachial neuritis or paralysis of varying degree, involving any part or all of the brachial plexus.

Bone infection with osteomyelitis of the lower cervical spine always causes local pain but may refer the pain, as a result of pressure of an extradural abscess, upon the cord and nerve roots. Other categories discussed include brachial plexus pressure, scalenus anticus syndrome and shoulder lesions such as tendinitis with and without calcification and rupture of the supraspinatus tendon, and miscellaneous lesions including heart disease, intrathoracic tumor, herpes zoster, bone tumors, and causalgia. The possibility of referred pain should always be considered, and an accurate diagnosis of the cause of the pain should be made before treating neck and shoulder pain syndromes.

Kenneth E. Sherman, M.D.

The Painful Shoulder. Selwyn Nelson. *Med. J. Australia*, 1952, 2: 293.

The problem of painful shoulder was approached from the standpoint of differential diagnosis. Painful disorders of the shoulder region may arise in three ways: (1) from disease of local structures, (2) from lesions of the brachial plexus or its central connections, and (3) from visceral pain referred to the shoulder.

Attention has been paid to the mechanisms involved in the production of the pain in the more obscure conditions.

Fibrositis may affect the trapezius muscle or the rhomboids, giving rise to shoulder pain. Palpation of the muscles will reveal trigger zones, pressure on which reproduces shoulder pain. These zones may feel indurated. The injection of 1 per cent "novocain" solution into these areas frequently gives great relief. Several zones may be treated at one time, but repeated injections are often necessary at intervals of a few days. Sodium salicylate or acetylsalicylic acid should be given in these cases. It is frequently found that such patients have some psychopathic features. Careful interrogation will reveal two factors, one a life situation causing stress, the other an abnormal reaction to the life situation. The former may occasionally be relieved either by the patient or relatives. The mechanism of these psychic factors in the causation of fibrositis is obscure.

The following list shows the main causes of pain in the shoulder region of neurological origin: (1) lesions within the spinal canal—syringomyelia, cervical cord tumor, pachymeningitis (hypertrophic), adhesive spinal arachnoiditis, radiculitis, and herpes zoster; (2) vertebral disorders causing pressure on the cord or nerve roots—injury, cervical disc lesions, osteoarthritis, tuberculosis, and neoplasm (primary or secondary) of the cervical part of the spine; (3) brachial plexus lesions—brachial neuritis, cervical rib and related pressure lesions, Pancoast tumor, acroparesthesia; (4) reflex sympathetic dystrophies—causalgia, and the "shoulder-hand syndrome."

Syringomyelia may be unilateral at the outset and pain may dominate the picture.

Cervical cord tumors are characterized by root pain radiating to the dermatome involved. In addition there is hyperaesthesia, possibly segmental sensory loss, and a segmental lower motor neuron lesion. The ascending and descending tracts of the

cord are involved to a greater or lesser extent, and the sensory and motor changes arising therefrom may be demonstrated. Lumbar puncture will reveal signs of block—increase in the protein content of the cerebrospinal fluid associated with impairment of the Queckenstedt response. Myelography will demonstrate the site of the lesion.

Pachymeningitis of the hypertrophic type may affect the cervical region. It may be due to tuberculosis, but syphilis is the most common cause. The clinical picture is difficult to differentiate from that of cervical cord tumor.

Cervical disc lesions cause either a central or, more commonly, a lateral protrusion of the disc. In the former case no compression of the local nerve roots occurs, the neurological signs being due to compression of the cord. The common site of protrusion is between the fifth and sixth or sixth and seventh vertebral bodies.

Generally the pain from intervertebral disc protrusions is associated with demonstrable wasting of some muscle groups, such as the triceps, and some patches of diminished sensation can be demonstrated. For this reason it is thought that the pain in this case is due to pressure on the nerve roots by the osteophytes.

Not all patients showing roentgenographic evidence of a cervical rib suffer any effect from it; the rib is a congenital abnormality and symptoms frequently arise quite late in life, if at all.

The condition known as acroparesthesia is usually found in women about the time of the menopause. The chief complaint is an unpleasant tingling sensation noticed especially at night, affecting the hand and often associated with pain in the upper part of the arm and shoulder. It may be bilateral, but much more commonly it is unilateral. In these unilateral cases the right side is usually affected in right-handed persons. No objective neurological signs can be demonstrated. Vascular changes may also play a part. Relief may be given by exercises designed to improve the tone of the shoulder girdle muscles combined with substitution therapy to correct any hormonal deficiency. The carrying of heavy shopping bags by the patient should be forbidden.

Concerning the "shoulder-hand syndrome," three phases are discussed. The first is a painful disability of the shoulder associated with either a sudden or an insidious onset of generalized swelling and stiffness of the hand and fingers. The second phase, coming on 3 to 6 months after the onset of the first and occupying a similar period of time, consists of both gradual resolution of the shoulder condition and reduction of the swelling of the hand; stiffness and flexion deformity of the hand then become manifest. During the third stage, trophic changes of the hand become noticeable.

It is suggested that the "shoulder-hand syndrome" is not a complication of angina pectoris, but rather of myocardial infarction.

C. FRED GOERINGER, M.D.

The Diagnosis and Treatment of Scapulocostal Syndrome. A. S. RUSSEK. *J. Am. Med. Ass.*, 1952, 150: 25.

In the early symptoms of this syndrome, shoulder and scapular pain are prominent. When well established, the radiation zones become the painful areas and shoulder pain may be minimal or absent. The radiation apparently is of reflex nature on a cord segmental basis, depending on the level of the peripheral stimulus. The stimuli may originate either in the extremely sensitive tissues beneath the scapula or in the suspending muscles of the scapula in spasm.

The syndrome can be of primary, secondary, or static type. The primary type occurs in middle age (35 to 60) among those whose posture has deteriorated. The condition may be due to habitual slouch, allowing the shoulders to roll forward and the scapulae to slide laterally, or to poor occupational sitting habits often seen among physicians, typists, chauffeurs, and machine operators. The poor fit of the retracted scapula in its new position against the changing angle of the ribs, for a prolonged period, is responsible for setting up the pattern of symptoms. These are the patients who can voluntarily correct their faulty posture. Fatigue is a very prominent factor in these cases. Most patients with the primary type of this syndrome have no pain in the morning, the symptoms becoming progressively worse toward the end of the day's work. Some patients, however, have the greatest amount of pain in the morning and they improve through the day. These are the patients whose bed posture is improper. Those who use high pillows, allowing the shoulders to sag and the head to be drawn to one side, fall into this group.

The treatment is briefly outlined with emphasis on the elimination of the altered scapulothoracic relationship by physical or mechanical means after injection of the trigger points. A representative case history of each form is presented.

C. FRED GOERINGER, M.D.

Chronic Sclerosing Perisynovitis of the Dorsum of the Hand. G. MCKENZIE. *Austral. N. Zealand J. Surg.*, 1952, 22: 70.

The degree of disability which may follow an apparently minor injury to the hand is well known. Frequently trauma, which would not be described as severe, is followed by a long period of incapacity, and in some cases by enough permanent impairment of function to make a change of occupation necessary.

The development of "hard edema" of the dorsum of the hand after an injury was first described in 1901 by Scretan. It is limited to the back of the hand and does not involve the wrist and fingers. In some cases it remains localized to one part of the dorsum. The condition is one of fibrosis, macroscopically and microscopically. It is also one in which differentiation to synovial tissue takes place, as is shown by the presence of synovial spaces. The condition is the result of some kind of injury to the tissues, usually a

mechanical one. There is much to suggest that extravasation of blood is a factor but it cannot be the only one. In most cases a hematoma resolves. It may, in certain circumstances, become organized and form fibrous tissue; in other circumstances it may form a cyst. There may be an associated circulatory disturbance, particularly in tissues subject to movement.

A special group of these conditions is illustrated by 3 cases in which a comparatively slight injury to the dorsum has resulted in several months of disability. In 2 of them permanent impairment of function seems probable. A fourth case is added because of the similarity in pathology, although disability in this case has been minimal.

The prognosis is poor in that persistence or recurrence of the condition is often seen.

Excision of the fibrous tissue was followed by some evidence of recurrence in 2 cases of the 4. They were the 2 cases in which the dissection was most extensive. In a subject in whom organization of a hematoma has occurred following an injury it is only to be expected that organization may occur in any extravasation of blood following excision. If excision is to be carried out, every attempt should be made to reduce the amount of extravasated blood present in the tissues after operation. This requires dissection without a tourniquet so that all severed vessels may be secured, and the application of a pressure dressing. C. Fred Goeringer, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Surgical Treatment of Defects of the Long Bones.

Ivar Palmer. *Acta chir. scand.*, 1952, 103: 381.

Pseudarthrosis is usually treated by bone grafting of one kind or another. The operation has a twofold purpose: to bring about fixation and to reanimate and maintain osteogenesis until consolidation with incorporation of the graft has been achieved. In cases of nonunion of fractures, it is essential to differentiate between delayed healing and manifest pseudarthrosis. It is also necessary to distinguish between the different forms of pseudarthrosis. There is the firm pseudarthrosis, in which the fragments are joined by stiff fibrous tissue permitting only the minimum of mobility, and there is the mobile pseudarthrosis in which the fragments are separated by a real joint cavity containing mucous, synovialike fluid and in which the whole is surrounded by a fibrous ring resembling a capsule. Finally there is the defect pseudarthrosis, in which the fragments are not in contact with each other and, instead of becoming adjusted to fit into one another, end in tapered, rounded stumps. On the whole, the satisfactory treatment of defects in the long bones must still be regarded as an unsolved problem.

The writer describes an experimental investigation made in the hope of finding a method for treating defects of the long bones. The combination of V-nail and cylindrical homotransplant does not provide satisfactory healing. Absorption defeats apposition. Live, bridging bone cannot be produced. The addition of fresh cancellous autochips changes the picture.

Experience indicates that a homotransplant is almost as good if not better (due to availability) than an autotransplant, assuming that conditions are what we might call favorable for transplantation. Such conditions are present, for example, in operations on the spinal column, in the filling of bone cavities, in arthrodesis, and in ordinary pseudarthrosis. Conditions are unfavorable for transplantation when a true defect is to be bridged and the major part of the transplant will thus be deprived of contact with an osteogenetic bed. The experiments were performed on relatively large dogs with fused epiphyseal lines. In all the cases the operation was done on a femur which had been osteotomized in the middle. Medullary nailing was done with an ordinary V-shaped Kuntscher nail inserted from the trochanteric fossa. External fixation was not done.

The author conducted five series of experiments utilizing various combinations of grafts and intramedullary fixation. The desired results were accomplished by a triple procedure consisting of medullary nail for fixation, cylindrical homotransplant for structural design, and fresh cancellous autochips for osteogenesis. The result of this may be a partial defect. To avoid this kind of unequal healing, it is essential that the entire circumference of the homotransplant be well covered by cancellous autochips. If the chips are dislodged into the soft parts so as to come to lie at a distance from the transplant, their osteogenetic influence will also come to naught.

Infection at the site of the transplantation leads to absorption of the autochips and sequestration of the homotransplant without consolidation. The threat of absorption can be checked by secondary autotransplantation.

During the course of the experiments, the author had occasion to operate on a 55 year old man with a defect in the humerus. Ten years before admission the patient suffered a comminuted compound fracture in the middle portion of the right humerus. Six operations, in which both inlay and onlay grafts were utilized, had been done at different hospitals. He was hospitalized on this occasion for a fracture of the femur, which was treated with osteosynthesis. A 2.5 centimeter long cylindrical bone transplant was removed from the tibia of a woman who had died 2 weeks previously following an operation for hernia. The specimen had been preserved by refrigeration until the day it was used. Bacteriological culture of the specimen was negative. Cancellous autochips from the iliac crest were packed thickly around and beyond the homotransplant. Convalescence was entirely satisfactory with progressive osseous consolidation. The arm was stable after 12 weeks.

The only way the bridging of a defect can be achieved is by means of a triple procedure, as follows: medullary nail for fixation, cylindrical homotrans-

plant for structural design, fresh cancellous autochips for osteogenesis. The chips exert a remarkably strong osteogenetic influence, and they are able to accomplish what is an absolute condition for success, namely, the formation of bone in the defect itself, under the soft part passage of the homotransplant. A bridging callus can thus be formed within one month of the operation, or before the homotransplant has been overly weakened by absorptive processes. C. FRED GOERINGER, M.D.

The Treatment of Pseudarthrosis of the Diaphysis of the Long Bones; Revision of Personal Material; Considerations Based on Personal Methods and on the Experience of Others; Conclusions (Del trattamento delle pseud-artrosi diafisarie delle ossa lunghe; revisione del nostro materiale; considerazione sui medodi nostri ed altrui; conclusioni). GUISEPPE SEGHINI. *Arch. chir. ortop. med.*, 1952, 17: 315.

Although the material presented by the Instituto di S. Corona, Genoa, Italy, amounts in all to 42 cases of pseudarthrosis, it is so subdivided by the nature and location of the lesions that it permits of few generalizations of a categorical character. There were 7 cases of pseudarthrosis of the femur; 23 of the tibia (comprising post-osteomyelitic pseudarthrosis of childhood, 5 cases, post-osteomyelitic pseudarthrosis in the adult, 3 cases, congenital pseudarthrosis, 3 cases, and "common" pseudarthrosis, 12 cases); 3 cases of pseudarthrosis of the humerus; 3 cases of pseudarthrosis of the radius and ulna; 3 cases of monosegmentary pseudarthrosis of the radius; and 3 monosegmentary lesions of the ulna. By the designation "common," the author intends those pseudarthroses resulting from simple or infected fractures without osteitic episodes.

After reviewing his own material and that appearing in the medical literature, the author feels constrained to limit himself to offering his impressions and opinions (frequently unsupported by personal experience) along with some of the newer and better known methods of treatment. Thus, from his study of the literature and from his personal experience, he gains the impression that the many etiologic factors such as dysharmony of hormones, vitamin deficiencies, dietetic errors, general conditions favoring disturbances of the Ca-Ph equilibrium, syphilitic vascular disease, etc., will require special and expert treatment; nevertheless, the *sine qua non* of cure still remains the care and experience in planning and the expertness in carrying out the operations.

Among these operative procedures, those in most general use are the autoplastic techniques. The autoplastic procedures are especially to be recommended in the treatment of pseudarthroses with loss of bone substance, although they may advantageously be supplemented by metallic bracing where such bone loss is present. The results in the author's own material support such a view.

Limiting our attention for the moment to the autoplastic graft, we find that the author is not in favor of using the intramedullary splinting (infibulation) technique. He regards this form of graft as favoring vascular insufficiency by destroying the endosteum and marrow structures, representing but meager supplement of bone substance and holding the fracture ends apart in such a manner as to impede the favorable effects of weight-bearing on the formation of callus. This method can, at most, be used when the fragility and atrophy of the bone stumps do not permit of the employment of fixation of the transplant by screws or by sliding grafts (Albee: *Surg. Gyn. Obst.*, 1930, 51: 283), or by onlay or apposition grafts, or in the epiphysial or metaphyseal areas.

The autotransplant, performed by sliding-graft methods, is excellent when there is no loss of bone substance; it is, however, a delicate procedure. Of more recent approval and use is the massive single bone graft of Campbell-Henderson. Such a transplant can be fixed by means of catgut, silk, steel wire, or screws. The vitallium screw is doubly advantageous in that it combines valid usage with optimum toleration by the tissues. Here one should not forget the pronouncement of Merle D'Aubigné that a more secure hold is obtained with the retention screws applied in an oblique direction. The most successful use of the metallic protheses is seen in the tibia, in the radius, and eventually in the cubitus. Such measures are precarious in the femur and humerus.

The author believes that the onlay graft is superior in most usages to the sliding graft. It may be used for the tibia, the radius, the cubitus, and—in lesser measure—the humerus, preferably in instances of loss of bone substance.

For the double radioulnar pseudarthroses, the author prefers the sliding graft for the radius, and a plate with screws on the cubitus. He has had little experience with the methods of transplant combined with metallic prothesis, either in instances with or without loss of bone substance. Whatever the method, however, it is believed that plenty of bone substance should be provided with the transplant, which may be from the tibia when more support is desired and from the ala ilii (L. Tavernier. *Lyon chir.*, 1946, 40: 545; *Inst. Abst. Surg.*, 1947, 84: 474) for a more active osteoformative bone substance. The author supports the views of Albee—and against Talbot and others—with reference to the superiority of the osteoperiosteal graft.

With reference to metallic prostheses, the author repudiates the use of plates and bands of metal in favor of the more modern techniques. Experience with the Kuntscher method of intramedullary infibulation has been very limited; however, the author believes that the results to date warrant further use of the method, so long as one observes the limitations placed on the procedure by Boehler (fracture line not closer than 7 cm. to the apex of the trochanter or to the distal epiphysis; for the humerus, a distance of not less than 9 cm. from the elbow and 5 cm. from the shoulder; for the forearm, not less than 5 cm. from the articular extremities). The use of Kuntscher's

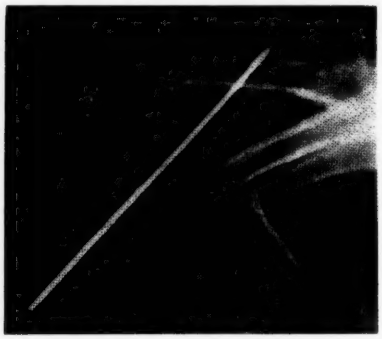

Fig. 1 (Peacock). The internal splint immobilizing the finger in the desired position.

nail in the tibia is of doubtful value; here one should give preference to a graft fastened with screws, to a sliding bone graft or, eventually, to a metallic plate. It is the author's impression that more satisfactory results with the Kuntscher nail will be achieved if the surgeon provides plenty of osteoformative bone substance (bone chips, grafting) at the point of pseudarthrosis.

The metallic plate is most frequently used on the humerus, tibia, and cubitus; however, for the subperiosteal resections of the tibia for osteomyelitis, only the autogenous graft or autoplastic fixations can offer good results—with abundant supplementation of bone substance, careful local protection, and the aid of the antibiotics. Likewise, in congenital pseudarthroses, where some form of vascular insufficiency is suspected, only the abundant supplementation of osteoformative bone substance, perhaps aided by a centromedullary (nail of Delitala) or exomedullary (Lane plate) form of metallic bracing, will give prospects of cure. Here, however, success is quite frequently attained and it is a "far cry" from the day when many surgeons advised amputation in the presence of a congenital pseudarthrosis.

JOHN W. BRENNAN, M.D.

Dynamic Splinting for the Prevention and Correction of Hand Deformities. A Simple and Inexpensive Method. ERLE E. PEACOCK, JR. *J. Bone Surg.*, 1952, 34-A: 785.

Drop-finger at the distal joint or mallet finger from injury is due to a tendon rupture at the insertion of the extensor tendon of the finger which is permitted to heal without adequate immobilization. Direct or indirect trauma may contribute to the deformity. Sudden overflexion of the distal phalanx, in the majority of cases, is provocative of the disabling drop-finger.

The author describes adequately the anatomy of the distal phalanx, particularly that of the extensor apparatus, and the role played by the terminal tendinous fibers of the intrinsic muscle, namely, the lumbrical and interossei muscles, which fuse with the extensors. He emphasizes the necessity of relaxing the intrinsic muscles by flexion of the middle joint during the period of immobilization. Many of the time-honored corrective procedures are enumerated.

His treatment consists of an internal splinting of the distal phalanx, traversing the joint with a medium calibered (.45 inch) stainless steel Kirschner wire to the proximal phalanx. The middle joint is held in 60 degrees of flexion (Fig. 1). To avoid skin irritation, the ends of the wires are cut below the skin surfaces; hence, the skin punctures are permitted to heal over.

Twelve patients were treated in less than 1 week from the onset of trauma, in whom immobilization alone was executed. In the other half of the series both operative and immobilization procedures were performed. Optimum functional restoration was achieved in all of the cases. The pins were routinely removed at the end of 5 weeks.

SAMUEL L. GOVERNALE, M.D.

Subtotal Reconstruction of the Thumb. J. WILLIAM LITTLER. *Plastic & Reconstr. Surg.*, 1952, 10: 215.

This article illustrates primarily the contribution of an adjacent digit to the formation of a very useful thumb.

The neurovascular pedicle method of digital transposition is described.

After the provision of the necessary length to a thumb amputated through the distal metacarpal, by the one-stage transfer of a portion of the index finger, the three elements pertinent to useful function are sensation, stability, and independency of movement. A thumb reconstruction must have stability, and a reduction of one joint is required when an index finger is transposed and recessed. Stability of the thumb's metacarpophalangeal joint is imperative for a strong pinch. Useful function of the terminal phalanx, which is extended primarily by the extensor pollicis longus and flexed by the flexor pollicis longus

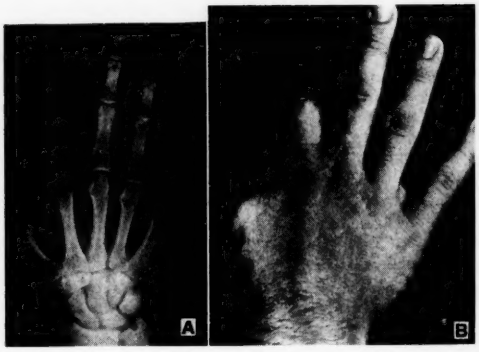

Fig. 1 (Littler). *A*, Showing the roentgen status of a right hand prior to reconstruction. Thumb has been amputated at the metacarpophalangeal level and the index finger through the proximal phalanx. *B*, Showing marked scarring along the radial border of the thumb remnant.

tendons, requires the action of the intrinsic muscles to stabilize the metacarpophalangeal joint. Of the four intrinsic muscles acting on the proximal phalanx, two, the adductor pollicis and the abductor pollicis brevis, contribute to the dorsal aponeurosis for extension of the terminal phalanx, which is not unlike that of the fingers. Loss of the intrinsic flexors innervated by the ulnar nerve (adductor and flexor brevi muscles) all but destroys the thumb and finger pinch; the metacarpophalangeal joint hyperextends and deviates laterally and the interphalangeal joint is then acutely flexed by the flexor pollicis longus (Froment's sign).

Three cases are described and well illustrated. Two of the cases illustrate the neurovascular pedicle method of digital transposition.

C. Fred Goeringer, M.D.

Abduction Arthrodesis of the Hip. W. H. Kirkaldy-Willis and A. S. Mbuthia. *J. Bone Surg.*, 1952, 34-B: 433.

The authors describe their experience with abduction arthrodesis of the hip since 1947 when this operation was demonstrated by Watson-Jones and Osmond-Clarke of the orthopedic department of the London Hospital. The procedure may be indicated in nonunited fractures of the femoral neck, in certain cases of septic arthritis of the hip which have not responded to chemotherapy, in immobilization or minor exploratory operations, in cases in which the head and neck of the femur have been destroyed; in tuberculosis of the hip not responding to more conservative methods of treatment, and in old unreduced dislocations of the hip.

The hip joint is exposed through an anterior Smith-Peterson incision and the head, or head and neck, of the femur, sequestra, diseased bone, and infected granulation tissue are removed. With the gouge and chisel, the granulation tissue is removed and the acetabulum and greater trochanter are freshened. The limb is abducted to 45 degrees and bone chips cut from the anterior part of the iliac crest are employed to fill the remaining space of the acetabulum. After closure of the wound a double plaster hip spica is applied with the limb still in

Fig. 2 (Littler). Showing the union of the index metacarpophalangeal segment and a special intermetacarpal Kirschner wire distraction splint in position.

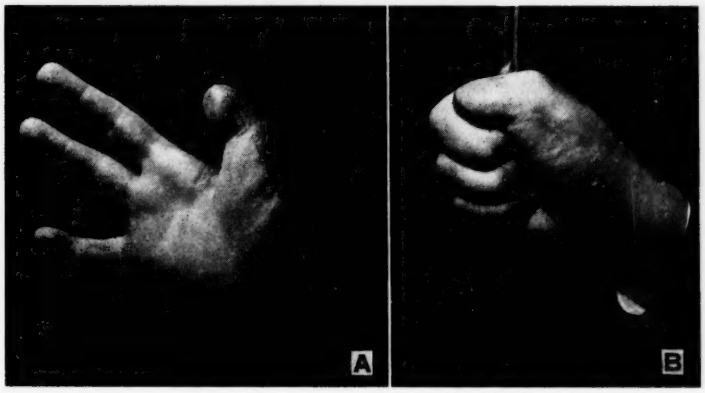

Fig. 3 (Littler). *A* and *B*, Functional results 2 months following completion of surgery.

abduction. About 4 weeks later, the femur is divided (through a lateral incision) about 2 inches below its upper end. The leg is adducted to lie between the neutral position and 5 degrees of abduction. The wound is closed and the hip spica is reapplied. In 14 of 16 patients operated on in 4 years, complete and bony fusion was obtained.

KENNETH E. SHERMAN, M.D.

Experiences in the Treatment of Perthes' Disease with Pitzen Nailing of the Femoral Neck (Unsere bisherigen Erfahrungen in der Behandlung der Perthesschen Erkrankung mit der Schenkelhalsnagelung nach Pitzen). HAUBERG and MATTHIASH. *Zschr. Orthop.*, 1952, 82: 436.

At best, the present way of treating Perthes' disease is not too satisfactory. The disadvantage is the prolonged treatment consisting of immobilization by bed rest and traction, by hip spica, or by a modified type of ambulatory traction. The literature indicates that the average duration of treatment has changed considerably in the past 20 years without producing any conclusive results.

Eighty-six cases were reviewed; 67 boys and 19 girls were treated between the years of 1925 and 1948. The results are similar to those reported in the literature. The authors report 12 cases in which 6 of the patients were treated by the Pitzen femoral nailing method and the other 6 were treated along conservative lines. The cases were subdivided in three groups. Those in group 1 presented the early stages of the disease, consisting of widening of the joint space and slight flattening of the femoral head. Those in the second group presented the more active phase of the disease with disintegration of the ossification center of the femoral capital epiphysis, and those in the third group presented evidence of a more stationary process.

In all of the cases early changes were noted. No definite explanation as to why the nailing enhanced the healing of the processes was offered. The authors did not try to enter the femoral capital epiphysis with the nail, but were satisfied to reach the epiphysis with the tip of the nail. They believe that the nail causes an irritation of the epiphysis and the surrounding area which helps the revascularization of the process.

GEORGE I. REISS, M.D.

Osteoplastic Arthrotomy of the Knee Joint (Gran artrotomia osteoplastica de la rodilla). ENRIQUE HERNANDEZ LOPEZ. *Cir. ap. locomotor*, Madr., 1952, 9: 184.

The author discusses a variety of incisions into the knee joint, appropriate for diverse purposes. He then presents his own technique through a modified anterior "Y" shaped skin incision. The infrapatellar tendon and a cube of tibial cortex at its insertion are elevated, and finally the tibial attachments of the cruciate ligaments are freed in one piece with a bone block from the articular surface below. The knee joint is explored in moderate flexion, with avoidance of trauma to the popliteal vessels.

Reconstruction is begun by replacing the block lifted from the tibial table and holding it in place with pegs of bone drilled through obliquely. The patellar ligament and its attached cortical fragment are replaced and held with linen sutures.

Five cases are recorded in which this technique was used with good results.

HOWARD ULFELDER, M.D.

Results of Bunion Operations (Erfahrungen bei Hallux valgus-Operationen). K. H. ROEMER and CH. BEHM. *Chirurg.*, 1952, 23: 386.

The following modification of Hohmann's method is recommended by the authors for the treatment of bunions.

Roentgenograms in 2 directions are made before the operation is done, to determine the size of the wedge to be excised.

Under local anesthesia the bursa is exposed and excised through a curvilinear incision. The abductor hallucis muscle is isolated and its tendon severed close to its insertion on the proximal phalanx. The metatarsophalangeal articulation is opened and the exostosis of the head of the first metatarsal bone is removed with a chisel. Only an intra-articular wedge-shaped osteotomy permits an exact apposition of the sectioned bones and prevents their displacement. The sesamoid bones may be placed in the correct position. After reduction the articular capsule is sutured with catgut. The abductor hallucis muscle is attached to the median side of the proximal phalanx.

After the operation a plantar plaster of paris splint is applied in such a manner that it forms a trough for the big toe. The splint extends to the lower leg and remains in place 3 weeks.

JOSEPH K. NARAT, M.D.

FRACTURES AND DISLOCATIONS

Electrophoretic Investigation of the Serum in Fractures (Elektrophoretische Untersuchungen nach Frakturen). KARL HINRICHS and WILHELM MARGGRAF. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1952, 272: 298.

The electrophoretic examination of the serum in fractures revealed that the alpha and the beta globulin showed a definite increase in the serum in the first 6 days following fracture of a bone. At the same time there was a decrease of the gamma globulin and of the albumin content of the serum. At the end of the sixth day the gamma globulin fraction increased while the alpha and beta globulin fraction decreased in amount. The lowest point was reached by the albumin content at the end of the fifth to the twentieth day after the fracture. All fractions recurred to their normal values after the second to sixth week after the fracture. These values returned to normal before the final union of the fracture occurred. There appeared to be no difference between simple and complicated types of fractures unless a frank infection occurred. There

was a particularly sharp increase of the alpha and beta globulin fraction after intramedullary nailing of a fracture. GEORGE I. REISS, M.D.

The Treatment of Metacarpophalangeal Stiffness by Capsulectomy (Traitement des raideurs métacarpo-phalangiennes; la capsulectomie). JEAN BÉNASSY and CONSTANTIN ELIOPOULOS. *Rev. chir. orthop.*, Par., 1952, 38: 237.

Capsulectomy as described by Sterling-Bunnell is simple and often very helpful. The disproportion in the large surface of the metacarpal head and the small glenoid surface of the basal phalanx is equalized by a fibrocartilage. The two lateral ligaments are taut in flexion and relaxed in extension. If an edematous finger is immobilized in extension the ligaments become thickened and shortened, preventing motion and eliminating the gliding of the phalanx under the condyle. The muscles involved are: the common extensor and the extensor proprius for the 30 degrees of extension, and the interossei and lumbricales assuring 90 degrees of flexion.

The simple technique consists in resection of the two ligaments (phalangeal and glenoidal insertion) without injury of the tendinous insertion of the interossei muscles; manipulation under anesthesia or capsulotomy is insufficient. Sometimes the resection of the synovial reflection at the extensor tendon is necessary. The approach is from a dorsal incision, followed by plaster immobilization in 90 degrees flexion of the metacarpophalangeal joints with motion starting after the third day. Good results were obtained in from 50 to 80 per cent of the cases, depending upon the extent of the condition. In cases of complete ankylosis a resection arthrodesis (Bunnell) with intramedullary pinning is necessary, and 30 to 40 degrees of flexion. The mobilization results at the thumb are not so good as they sometimes require excision of the trapezoid.

E. H. BETTMANN, M.D.

Digit Transfer by Neurovascular Pedicle. STERLING BUNNELL. *J. Bone Surg.*, 1952, 34-A: 772.

Transferring a digit with a neurovascular pedicle without any skin is a new method. It may be used in transferring either end of a digit to the stump of another or in transferring any finger to act as a thumb.

Whenever possible, all tendons of the transferred digit should be carried over with it to be shortened, if necessary, and to receive the stumps of the thumb tendons for reinforcement. The thumb should have normal skin of the volar surface of the hand which contains special touch corpuscles and which is still connected with its nerve supply.

In the case illustrated in the presentation, a whole index finger was transferred to the stump of the missing thumb, the finger being completely circumscribed and transferred on its neurovascular pedicle only. The pedicle consisted of the two volar digital nerves and vessels. The nerve to the second interdigital cleft was split to the base of the palm so that each branch of the nerve was preserved. At this cleft the arterial branch to the long finger was tied off. The distal third of the metacarpal of the index finger was pinned by Kirschner wires to the stump of the thumb.

The transferred digit lived well and had a good circulation and normal sensation. Motion will be furnished later by connecting its flexor tendon.

DONALD C. GEIST, M.D.

Resection of the Remaining Bonebridge in Extensive Gibbosities of Pott's Disease (Resection del'anneau vertébral restant dans les grandes destructions du mal de Pott). SUZANNE BÉRAUD-PICARD. *Rev. chir. orthop.*, Paris, 1952, 38: 309.

Healing of the tuberculous spine takes place either by solid bony union or by fibrous ankylosis. It is not possible to obtain a cosmetically satisfactory result in all cases although in some patients no gibbus results because of the formation of counter curves below and above the lesion. The disintegration of the vertebral focus is accompanied in most cases by paraplegia of various degrees.

In a 13 year old boy with complete paraplegia not responding to extension and rest for 5 months, the posterior arch of D_4 was removed in toto with almost complete disappearance of the motor and sensory involvement; only the Babinski sign remained. The procedure was carried out as follows:

Section of the interspinous ligament was done between 3 vertebrae, and followed by resection of the spinous process, division of the 2 laminaelike ribs, and removal of the transverse process with the upper and lower facets on either side. Technically, the procedure is not regarded difficult and there is no shock; it is indicated in cases of paraplegia with the vertebral body already so far disintegrated that it does not prevent the adaptation of the 2 adjacent vertebral surfaces. Laminectomy alone does not relieve the pressure on the anterior portion of the spinal cord. ERNEST H. BETTMANN, M.D.

Suggestions for Improvement of Late Results in the Treatment of Femoral Neck Fractures (Comment améliorer les résultats tardifs dans le traitement des fractures du col du fémur). M. DUBOIS. *Rev. chir. orthop.*, Par., 1952, 38: 246.

The late results of fractures of the femoral neck (pseudarthrosis, necrosis, and secondary arthritis) can be evaluated only after about 4 or 5 years. In a follow-up of this type, Dubois found good results in only 45 per cent of the patients examined. The trabecular structure with the arc of Bigelow, which is formed as a weight-bearing system under the influence of intermittent pressure does not produce bone when subjected to tension, flexion, or shearing forces.

In the latter case nonunion will occur. The rhythmic muscle play is of great importance in the healing process. Even with good mechanical correction the biological prognosis should be guarded in view of the delicate nonpredictable blood supply.

It is emphasized that the pretraumatic stage is already shown by the disappearance of trabeculae in the region of the femoral neck with foci of micronecrosis, followed by insufficient repair and a predisposition to increased fragility, which eventually leads to spontaneous fractures. These are the transformation zones or "Umbauzonen" of Looser. In the presence of senile osteoporosis the biological power of regeneration is reduced. Such considerations make the application of a prosthesis more justifiable except that there is a greater operative risk. The introduction of a bone graft, even when not completely viable (as the cortical part dies), is biologically necessary to promote osteogenesis.

In following the method of Matti, Dubois uses spongious material curetted from the greater trochanteric region, filling it into a channel drilled parallel and below the nail insertion. By the insertion of viable spongious bone into the critical fracture region, the complications mentioned may be greatly reduced. The observation time for this interesting modification is too short to admit any judgment of its value. E. H. BETTMANN, M.D.

Closed Reduction, Plate Fixation, and Medullary Nailing of Fractures of Both Bones of the Leg. A Comparative End-Result Study. J. OTTO LOTTES, LLOYD J. HILL, and J. ALBERT KEY. *J. Bone Surg.*, 1952, 34-A: 861.

This study is comprised of 216 fractures of the tibia. Of these, 125 were simple and 91 were compound. During the past 3 years 77 fractures of the tibia were treated by nailing. None of the patients were treated by the resident staff. However, the closed reduction and plate fixation group were treated largely by the resident staff. The type of plates employed were: Lane, Townsend and Gilfillan, and Eggers.

The medullary nail used in this series was designed by one of the authors; it was a triflanged nail made of 18—8 SMo stainless steel with a curve at each end. Insertion of the nail was accomplished by drilling a hole just medial to the tibial tubercle at a 30 degree angle. Reduction and nailing was done by the closed or blind method except in severe and comminuted fractures. Before the nail was driven home, the position of the pin and bone fragments was routinely examined by means of x-rays. The limb was encased in a plaster of paris cast from the toes to the groin.

The average time spent in the hospital by patients with simple fractures was 1.9 months in the group treated by closed reduction and fixation in a cast, 2.7 months in the group treated by open reduction and internal fixation with plates, and 1.2 months in the group treated by closed reduction and medullary nail fixation. With exception of the medullary nail fixation fractures, all of the compound fractures required a much longer period of hospitalization.

Full weight bearing with casts was permitted; in the medullary fixation group 44 per cent were walking with casts at the end of 1 month, 80 per cent at the end of 2 months, and 95 per cent at the end of 3 months, respectively. In the simple fractures without internal fixation, full weight was not permitted until 3.9 months had elapsed. Moreover, walking with full weight was prohibited for 5.1 months in the plate fixation group. However, full weight was possible at the end of 1.5 months in the nailing group.

The complications were those of nonunion in from 16 to 35 per cent of the patients with compound fractures who were treated by closed reduction and plate fixation but no such complications followed medullary pinning. Infections occurred most often in the compound fractures (8 to 10%) which were treated by the closed and plate fixation method. Only 3.3 per cent of the patients in the medullary pinning group developed infection. Other complications encountered in the authors' series were: loss of skin at the site of compound fractures, varus or valgus deformity, and shortening and rotation of the distal fragments. By and large, these complications were more predominant in all but the intramedullary immobilized cases.

The conclusions drawn from the present studies clearly indicate that the tibiae required a longer period of immobilization, especially those of older patients and poor patients who failed to return to the clinic at specified intervals. Since many of these patients were treated by the house staff who had very little experience and are taught to err on the side of conservatism, it is obvious that convalescence was generally delayed. The authors are of the opinion that many fractures of the tibia can be nailed with relative ease, and if they are then plastered from toe to groin, the union can be achieved in a shorter period of time than with any other procedure. The oblique fractures are not suitable for pinning but are more amenable to the use of one or more transcortical screws. SAMUEL L. GOVERNALE, M.D.

ORTHOPEDICS IN GENERAL

The Treatment of Bone and Joint Tuberculosis; Effect of 1-Isonicotinyl-2-Isopropylhydrazine. A Preliminary Report. DAVID M. BOSWORTH, HOWARD A. WRIGHT, and J. WILLIAM FIELDING. *J. Bone Surg.*, 1952, 34-A: 761.

The authors present a preliminary report of the use of the isonicotinic hydrazides in the treatment of bone and joint tuberculosis. Both isoniazid (isonicotinic acid hydrazine) and iproniazid (isonicotinylisopropylhydrazine) were used.

Early clinical benefits revealed that constant temperature reduction and very great and consistent weight gain occurred. Pain relief was universal and marked. With the relief of pain, euphoria gradually developed. Wound healing was observed and sinus drainage changed from a thick flocculent discharge to a serous and less irritating type. Deep sinuses healed. Capillary dilatation and flushing of the skin were routine findings.

The extent of surgery will apparently be decreased and surgery will be made possible in patients who

previously would not have been considered suitable for surgery. Sinuses have healed and also have been prevented. Of 35 sinuses, 23 have healed and remained healed; 15 are open or have spontaneously re-opened and closed. Of 15 residual open sinuses, 10 were negative to guinea pig inoculations. In 3, the cultures were reversed from positive to negative in 4 to 6 weeks and have remained negative. These findings would seem to indicate that there was complete control of Mycobacterium tuberculosis in bone and joint tuberculosis with mixed-infection sinus formation.

Toxic manifestations are due, first, to concentration of the drug in the spinal fluid and, second, to liver damage. Jaundice was noted in 1 patient and was considered to be of a toxic type. Slight dizziness and somnolence occur early but decrease on continuance of the drug. Mild tremor and hypertonic reflexes usually occur. Ankle clonus may occur with the usual amounts of medication. With increased toxicity the clonus presents itself and becomes sustained. It appears to be the clinical warning sign for reduction of the medication and gradual restoration to the point of hypertonic reflexes but not clonus. Several central neurotoxic symptoms developed in 3 patients; 2 of these had psychoses and 1 had a cerebrospastic convulsive coma during the course of jaundice.

Sympathetic neurotoxic symptoms were seen also. Dryness of the mouth and excessive sweating occurred occasionally. Weakness of visual accommodation was frequently noted. Urinary hesitancy, obstipation, and (in males) impotence were observed.

Thirty-four patients were under continuous study; 21 are still hospitalized and 13 are discharged. Six of the latter have stopped the drug. Two patients died, 1 in 8 days, before any drug effect was noted.

It is believed that iproniazid may be begun in a dosage of 4 mgm. per kilogram of body weight. If clonus develops the dose should be decreased to 2 mgm. or lower and then slowly increased to the point of hypertonic reflexes only.

Among the patients treated there were 30 lesions of the bones, 22 of the joints, 4 of the skin, 2 cases of meningitis, 2 of tendon sheath infection, 8 fascial lesions, 1 case of peritonitis, and 1 genitourinary lesion. Response was good in all. Routine laboratory examinations and liver function tests revealed no change related to the drug therapy. X-ray study showed a generalized osseous decalcification occurring after 9 to 12 weeks of medication. The cortex seems to become thinner and atrophic, the cancellous structures appear atrophied, and union of surgical ankyloses seems to be hastened.

The drug was used in a few patients with nontuberculous disease. Two patients with infected compound fractures and 2 with chronic osteomyelitis were benefited. A patient with a destructive neoplasm of the right pelvis received great relief from pain and was benefited otherwise. No complications were noted with regard to the anesthesia and to operations on the patients.

The authors are convinced that iproniazid is a great addition to the armamentarium for the treatment of tuberculosis. DONALD C. GEIST, M.D.

A Study of the Vascularization of Experimental Bone Grafts by Means of Radioactive Phosphorus and the Transparent Chamber. CLIFFORD L. KIEHN, FRANK CEBUL, MARVIN BERG, JAMES GUTENTAG, and DONALD M. GLOVER. *Ann. Surg.*, 1952, 136: 404.

In the study reported the authors employed radioactive tracer elements to determine the relative degree of vascularization, and in addition in vivo microscopic history of the developing blood vessels has been charted. In earlier communications, the authors described a technique for the study of the vascularization of fresh and frozen autogenous bone grafts. The same method has been used to compare the developing blood supply of fresh and boiled homologous bone transplants.

Fresh and boiled iliac chips removed from one animal were immediately placed in the abdominal subcutaneous tissue of another. The animal was given 300 microcuries of P^{32} intravenously, which was used as a tracer. The graft and controls were removed at intervals. The presence of the isotopes in the graft was detected with the Geiger counter after the tissue was processed by drying, ashing, and dissolving it in nitric acid. The presence of the isotope in the transplant is explained by diffusion of the tissue fluid and the blood stream supplying the graft. An increase in the number of capillaries and small vessels in the graft resulted in higher counts. Cancellous bone is more readily vascularized than is cortical bone.

A modification of the transparent chamber technique described by Algire and Legallais was employed in rats to study in vivo the reaction of the tumor transplants in the changing chemical environment. By this method, it is possible to observe directly whether the bone is absorbed, exfoliated, encapsulated as a foreign body, or incorporated as an integral part of the host animal. A portion of the ilium of the rat was implanted as an autogenous graft and serial microscopic and photographic studies were made of the capillary bed developing about the graft and the ingrowth of small vessels into the transplant.

The same procedure was carried out with boiled autogenous transplants. The dilated vessels seen in the boiled graft series are interpreted as being due to the reaction of a host to a foreign body. As the graft is brought in and out of microscopic focus the blood vessels can be seen to surround it completely as encapsulation takes place. In the vital grafts, on the other hand, the vessels seem to enter the cancellous layer of bone.

The summary of the results obtained together with the clinical application is as follows:

1. The presence of P^{32} when used as a tracer is detected in fresh homologous bone transplants when conveyed to them by the ingrowing blood vessels.

2. Vital grafts become vascularized within 12 days after transplantation as seen by the blood vessels growing directly into the graft.

3. Types of bone grafts in order of preference are (a) autogenous fresh grafts, (b) frozen autogenous grafts, (c) fresh homologous grafts, and (d) boiled or avital bone grafts. Homologous bone grafts should not be used if autogenous bone grafts are available.

KENNETH E. SHERMAN, M.D.

Biologic and Clinical Considerations on the Subject of Frozen Bone Grafts; Osteotheca or Bone Bank (Osservazioni biologiche e cliniche sui trapianti ossei congelati; osteoteca o banca dell'osso). C. PAIS and I. F. GOIDANICH. *Chir. org. movim.*, 1952, 37: 312.

Frozen bone grafts were used at the Rizzoli Institute, Bologna, Italy, in 100 patients. In this report, however, only 30 instances in which more than 6 months elapsed since the implantation operation are discussed. A table lists the 15 instances of pseudarthrosis, 4 of myeloplactic bone tumor, 3 of the Albee operation following hemilaminectomy, 2 of bone cysts, 1 instance of tuberculosis (healed) of the hip joint, 1 of sarcoma, and 1 of multiple chondroma of the carpal bone of the right hand.

The operations ranged all the way from the simple filling of the residual bone tumor beds with bone fragments, to reconstruction of the lower end of the femur, lengthening operation on the femur, and filling of the gap in the humerus following the resection of sarcoma.

The bone tissue selected for preservation by refrigeration was procured from noninfected patients without general diseases. The specimens were preserved in a sterile condition after removal by exposure to ultraviolet light and then inclusion in double glass containers which were hermetically sealed and kept in a deep freeze of General Electric manufacture.

All the transplants were well tolerated. In 5 instances, following the implantation, a brief period of elevated temperature occurred which did not interfere in any appreciable degree with the healing in of the graft. All of the grafts healed in; there was only 1 instance in which the final roentgenologic and functional examinations led to what was designated a "fair result"; all the rest were labeled "optimum."

The techniques for the implantation and the subsequent immobilization of the part were the same as for the nonrefrigerated grafts. Radiologically, the healing of the fragments was not appreciably different from that of the fresh homoplastic bone graft; perhaps the process was somewhat slower. In the beginning the graft would appear roentgenologically denser than the autoplastic graft; however, it would rapidly undergo its own characteristic process of rarefaction. The fusion would appear to be just as rapid, even in those instances in which the osteogenic periosteal activity of the host would seem to be below normal. Only in 1 instance did the roentgenologic examination disclose osteonecrosis; in 1 patient there was partial resorption of the graft.

In the authors' opinion the bone bank represents a definite advance in the technique of homotransplantation and with regard to the future of heterotransplantation.

JOHN W. BRENNAN, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

The Present Status of Arteriography in Germany. H. W. PAESSLER. *Angiology*, 1952, 3: 345.

Serial arteriography is used extensively in Germany for the diagnosis of peripheral arterial disease. The author describes his technique of injection of contrast media under pressure. An apparatus is used which takes 3 roentgenographs at any desired interval. The arteriogram is usually done with percutaneous puncture and not direct surgical exposure. The contrast agent used is 60 per cent per-abrodil M Bayer for arteriography and 80 per cent for aortography. Hyaluronidase is injected at the site of the skin puncture to prevent the formation of hematoma. The contrast agent is injected under pressure to insure maximum concentration in the various sections of the vessels. The use of a special cannula prevents perivascular injection. The interval between the 3 roentgenographs is determined by means of oscillometric examinations carried out with an oscillograph on both legs simultaneously, with automatic recording. FREDERICK W. PRESTON, M.D.

Direct Surgery of Arteriosclerosis. ORMAND C. JULIAN, WILLIAM S. DYE, JOHN H. OLWIN, PAUL H. JORDAN. *Ann. Surg.*, 1952, 136: 459.

The use of direct surgery in arteriosclerosis depends upon the recognition of the segmental nature of involvement in a certain number of cases of arteriosclerosis of the extremity. Although resection and vein graft or removal of the diseased inner layers of the vessels may be tried and will sometimes be successful in patients who have relatively diffuse forms of the disease, the proper application of these methods is to patients having mild involvement of the vessel above and below the area which is obstructed. In these patients there is a notable lack of change due to ischemia in the distal portion of the involved leg, while at the same time there is a remarkable loss of pulse. One of the best examples of this combination is seen in the so-called Le Riche syndrome of arteriosclerotic obstruction of the lower end of the aorta. The majority of patients that were treated by direct surgery have shown an absence of pulsation below the femoral, and a sharp drop in oscillometric reading distal to the common femoral artery bifurcation. Some have shown an absent femoral pulsation on one side, indicative of common or external iliac obstruction and 1 showed evidence of obstruction of the lower end of the abdominal aorta. Freedom from ischemia is the hallmark of segmental obstruction. This is due to the fact that collaterals can re-enter the main channel distal to the obstruction. During exercise these patients suffer claudication because of the inability of the collateral vessels to increase the blood flow adequately. Rest pain and neuritic pain, however, have characteristically been absent.

The final selection of individual patients for operation depends upon the arteriogram. This is best taken with the use of diodrast, either by the translumbar approach to the aorta or by open or closed puncture of the femoral artery. Several distinct types of arteriograms have been observed:

1. A smooth, normal appearance of the artery continues down to an abrupt point of complete obstruction which has in almost every instance been exactly at the level of a large collateral artery. A number of collaterals are usually filled and the main channel is distal to the region of obstruction and appears to be of a smooth contour, similar to the channel proximally. Such cases are selected for surgery no matter what length of obstruction is visualized.

2. The second type of arteriogram is one in which there is a segment of obstruction with visualization of the channel distal to the obstruction, but at the same time there are numerous irregular filling defects in the contrast study of the artery above and below. Such cases have led to operations and sometimes successfully.

3. The third general type of arteriogram is seen less frequently in these patients if they truly show the clinical signs described for segmental occlusion. It is characterized by a filled channel down to an abrupt obstruction with collaterals that seem adequate but which appear to enter more distant branches in the calf; there is, however, no filling of the distal femoral or popliteal artery. Such cases have been operated upon but most of the operations have failed because there was no distal vessel found suitable for anastomosis.

4. The fourth type of arteriogram is seen in patients with diffuse disease who retain a small but complete lumen. The roentgen ray shows multiple irregular filling defects plus calcification of the entire length of the vessel. The lumen is narrow but completely open. Operation has not been considered in this group.

With few exceptions the arteriograms and the findings at operation have been well correlated. The technique of the procedures of resection and vein grafting, as well as thromboendarterectomy (intimectomy), is described in detail. Resection of lengths of the femoral artery varying from 8 to 38 cm. with replacement by means of a vein graft has been done 19 times in 18 patients. Autografts were used in 16 operations and homologous vein grafts were used in 3. The autogenous grafts were taken from the saphenous vein or the superficial femoral vein of the same extremity. It is, of course, important to reverse the direction of the vein graft so as to remove the effect of any valves that may be present. The saphenous vein in almost every instance has proved its ability to dilate so as to be almost the exact caliber of the normal femoral artery. This is an

advantage over the superficial femoral vein, which proves to be much larger than the artery when under arterial pressure. Heparin has been used in about half of the patients with vein grafts. The indication for heparinization has been a failure to establish a vigorous circulation through the graft and, in addition, it has been used when the artery above and below the graft has had to be denuded internally in order to produce a more suitable end for anastomosis.

As experience with the placement of vein grafts increased, cases were encountered in which it was necessary to clean out fairly long segments of the proximal or distal arterial stumps with arteriosclerotic changes in order to preserve important collateral arteries such as the profunda femoris branch of the common femoral. Experience with this technique as the sole method of removing an obstruction has, with the exception of 1 case, been confined to the common and external iliac artery. Six cases of intimectomy have been done, 5 of the iliac arteries and 1 case of the superficial femoral artery. In the latter case, the segment so treated extended from the common femoral bifurcation to the popliteal bifurcation.

In a consideration of the results, 12 of the 19 grafts are termed successful in that they have produced a return of pulse at the level of the ankle and a great increase in the oscillometric index on the calf. The patients have, without exception, had complete relief from the presenting complaint of intermittent claudication. Six grafts have been termed failures. One death and 2 amputations of the operated extremity have occurred in this series. The 1 death resulted from coronary occlusion 3 weeks after operation and, in this instance, the graft was found to be open at autopsy.

Six patients have been subjected to intimectomy. A successful intimectomy of the superficial femoral artery was done in a patient who previously had had a resection and vein graft of the contralateral superficial femoral artery. In this case both procedures re-established the pulse, but the expected long term follow-up to compare the value of the two procedures could not be obtained because of the patient's suicide 3 months after the last operation. The remaining 5 operations were intimectomies of the iliac artery. Of these, 3 have remained open, as demonstrated by a translumbar aortogram or by the return of pulse at the femoral level, and 2 have apparently been reoccluded without benefit to the patients.

It is well to remember that although a segment may be removed and continuity restored there frequently are other arteriosclerotic segments present which may become occluded and thus vitiate the result. Rigid selection of the cases to be subjected to surgery on the basis of distinct visualization of a channel in the main vessel distal to the obstruction is considered necessary to limit the number of failures. There is very little danger of interfering with the blood supply of the extremity as long as one avoids bridge-burning extensions while doing the operation.

The authors believe that the best indication for intimectomy at this time exists in arteriosclerotic obstruction of the iliac arteries when there is involvement of the aorta without obstruction but sufficient to prevent a safe anastomosis. They believe that a vein graft is superior to intimectomy at the level of the superficial femoral artery where long segments are usually involved. In extending the basic principle of resection and replacement to the level of the aortic bifurcation, they have recently implanted a fresh graft into the aorta, including the bifurcation, in a young woman with the so-called Le Riche syndrome. LEROY J. KLEINSASSER, M.D.

The Treatment of Varicosities and Accompanying Complications. KARL SIGG. *Angiology*, 1952, 3: 355.

The author reports on the results obtained with 42,000 sclerosing injections for varicosities. When good sclerosing agents are used (sotradecol) and when careful technique is used, the results are good. The time required for treatment can be decreased considerably. Embolism and necrosis are completely eliminated, and the other common undesirable complications of sclerotherapy (pigmentation, perivenous irritation, pain) are greatly minimized. Patients can continue their occupation during the entire period of treatment.

If the proper method is used (injection with the leg in a horizontal position and elimination of intravaricose hematomas with incision and compression bandage) then recurrence after sclerotherapy will occur only rarely.

The ambulatory treatment of superficial and deep phlebitis with compression bandages using sponge-rubber foundation has given excellent results in the author's practice during the past 10 years. By this method it was possible to treat prophylactically 463 pregnant women who were bad risks as far as development of phlebitis was concerned, and to avoid occurrence of thrombosis during pregnancy and after delivery in all but 1 case. Nine hundred and twenty-six patients who had superficial and deep phlebitis were treated as ambulatory patients without the occurrence of embolism in a single case. When therapy with anticoagulants and compression bandage is combined, the results are greatly improved. A compression bandage on the leg is of great value during pregnancy and before and during surgery, especially for prophylaxis. It eliminates edema of the leg.

Leg ulcerations which follow 60 per cent of the cases of deep phlebitis can be treated with excellent results by the use of sponge-rubber compression bandages and sclerotherapy. Reporting on 2,200 cases of leg ulcers resulting from varicosities and phlebitis, the author states that these complications can be cured by ambulatory treatment; also, the other complications of varicosities and phlebitis (such as edema of the limb, elephantiasis, eczema, cramps) can be beneficially influenced by the sponge-rubber compression bandage treatment alone.

FREDERICK W. PRESTON, M.D.

Gangrene of the Lower Extremities Following Massive Thrombotic Obstruction of the Venous Bed Without Concomitant Arterial Obstruction (Gangrena degli arti inferiori da ostruzione trombotica massiva del letto venoso senza concomitanti ostruzioni arteriose). PIETRO TAGARIELLO. *Minerva med.*, Tor., 1952, 2: 500.

The author had occasion to observe a case of this very rare and therefore somewhat controversial clinical entity. A review of the literature reveals that only 27 cases were reported in the world literature up to 1950 (Haimovici).

Both sexes appear to be equally affected and the highest incidence was encountered around the age of 40. The site of predilection is the lower, rarely the upper, extremities. In most of the reported cases, only 1 extremity was diseased, but there are instances in which both limbs may present the picture of massive venous thrombosis with gangrene. In case of unilateral gangrene the other extremity may be intact or, more frequently, show signs of simple thrombophlebitis.

The author considers the hypercoagulability of the blood as the main etiologic factor of the syndrome and the massive extension of the thrombophlebitic process with subsequent necrosis of the tissues as secondary features. The main reason for these changes in blood coagulation is thought to be a depression of the secretion of heparin in the capillary and precapillary vessels.

The anatomopathological picture is characterized by a thrombotic obstruction of all the venous territory with necrosis of the tissues, while the arterial bed remains intact. The large veins of the thigh and the pelvis may or may not be affected. The coexisting edema is believed to be a direct consequence of the thrombophlebitic process. In order to have venous gangrene there must be obstruction of the last venous ramifications. Especially the obstacle occurring in the capillary bed explains the lack of fresh and oxygenated blood and accounts, together with the almost always present venous spasm, for the absence of reflux through the venous collateral vessels.

After a more or less prolonged latent period the events may follow an evolution characterized by a state of phlegmasia alba dolens (in 44 per cent of the reported cases) which develops into phlegmasia cerulea dolens and finally may reach the stage of gangrene.

The exact diagnosis may be very difficult to establish and in many instances the disease is recognized only in retrospect, mostly after examination of the amputated extremity. The exact nature of the disease cannot be established unless it is possible to demonstrate the permeability of the arterial bed. This can be obtained by arteriography which, in case of unsatisfactory pictures due to concomitant arterial spasm, may be supplemented by the administration of antispasmodics or by paravertebral blocks. This procedure allows the differentiation between organic and spastic arterial occlusion. As an ultimate diagnostic means an exploration of the main arteries appears to be justified. Simple thrombophlebitis, arterial embolism, septic gangrene, and mummification represent the main differential diagnostic problems.

The prognosis is very poor, even "quoad vitam," unless an early diagnosis allows the institution of the proper therapy which depends upon the stage of the morbid process. In the presence of phlegmasia cerulea dolens, the use of anticoagulants combined with antispasmodics, paravertebral blocks, and antibiotics appears to be the most effective therapy. In case of necrotic changes it is important to know that usually they are anatomically less extended than they appear to be. The necrotic areas may under adequate management remain restricted and lead only to localized anatomical damage. Amputation, therefore, should be reserved for intractable, progressive, and septic cases of venous gangrene.

R. SCHOBINGER VON SCHOWINGEN, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

The Recognition of Phlebothrombosis and Prevention of Pulmonary Embolism. O. S. CULP, J. BARRON, and J. K. ORMOND. *J. Urol.*, Balt., 1952, 68: 845.

In 1946 pulmonary embolism was responsible for 42 per cent of all deaths on the urologic service of the Henry Ford Hospital.

This problem was solved by recognizing early the signs and symptoms of phlebothrombosis of the lower extremities and the prompt institution of appropriate therapy. There have been no deaths from pulmonary embolism among urologic patients for 31 months. RALPH J. BENNETT, M.D.

The Use of Anticoagulants in the Prevention and Treatment of Postoperative Venous Thromboses (La medication anticoagulante dans la prevention et le traitement des accidents veineux postoperatoires). J. FAVRE-GILLY, S. ITHIER, R. BLANC, M.-F BOREL-MILHET, P. CROIZAT, and R. FROMENT. *Lyon chir.*, 1952, 47: 825.

The authors present their investigative studies in 100 cases of postoperative venous thrombosis or pulmonary embolism and 239 cases of so-called medical thrombosis—mainly arterial obliterations.

The technique that is accepted in most American clinics is described by these French authors. Heparin is administered at the onset of the thrombosis to treat the immediate thrombotic process while dicumarin, given simultaneously with the heparin, manifests its anticoagulant effect some 24 to 48 hours later. It is emphasized that this combined therapy is an effective method of treatment of venous thrombosis, since secondary pulmonary emboli are extremely uncommon. It must be admitted, however, that progressive thrombosis is seen in approximately 20 per cent of cases and residual edema of the affected extremity exists in approximately 33 per cent of cases.

The authors noted hemorrhagic complications in 10 cases (10%)—mild in 8 cases and severe in 2 cases—with dicumarol. In one of these patients fatal retroperitoneal hemorrhage occurred during the administration of anticoagulant therapy.

ORVILLE F. GRIMES, M.D.

Postoperative Thrombosis-Emboli. Their Frequency in the Period 1940–1948 at the III Department of Ullevål Sykehus and the Surgical Department of Akers Sykehus. ROALD ADELSTEN JENSEN. *Acta. chir. scand.*, 1952, 103: 263.

An analysis of mortality from circulatory diseases in Norway from 1927 to 1948 shows a marked drop in the war period from 1940 to 1945 and a marked increase after the war (Fig. 1).

The operations often followed by thrombosis were studied during the period from 1940 to 1948 at both the Ullevål Sykehus and the Akers Sykehus. The cases were divided as follows: group 1, in which the diagnosis of "thrombosis-embolism" was certain as manifested by pain in the chest, a rise in pulse or temperature, and positive findings in the sputum, x-rays of the chest, or at autopsy; group 2, in which the diagnosis was probable, as indicated by pain in the chest, a rise in pulse or temperature, and by the general clinical picture; group 3, in which the diagnosis was possible, as suggested by pain in the chest and

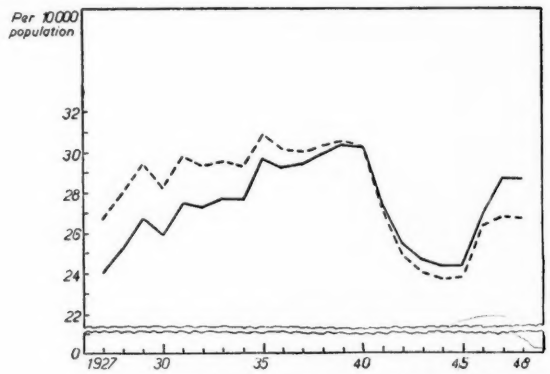

Fig. 1 (Jensen). Mortality from circulatory diseases in Norway from 1927 to 1948. Standard population = population of Norway in 1940.
Crude death rate ——————
Corrected death rate according to age ----------

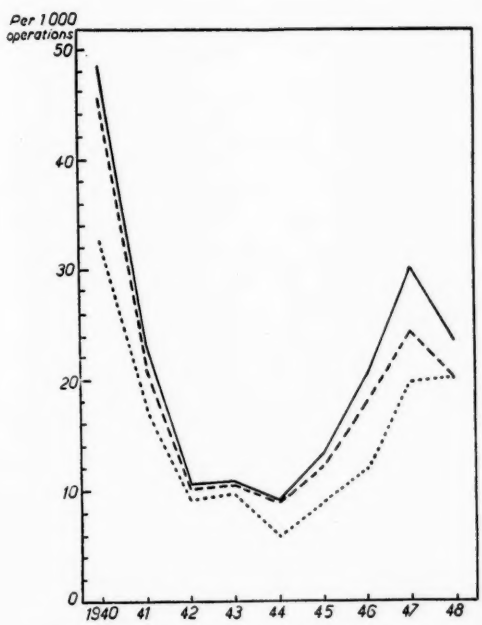

Fig. 2. The frequency of thrombosis-emboli after "thrombosis-dangerous" operations at the III Department of Ullevål Hospital.
Definite cases.....
Definite and most probable cases ----------
Definite, most probable, and possible cases ——————

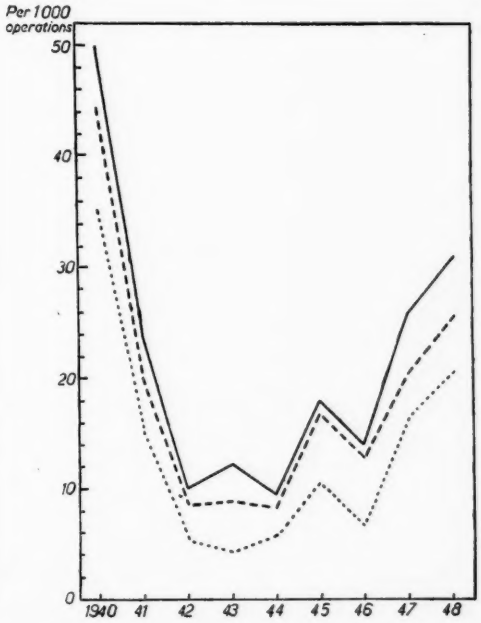

Fig. 3. The frequency of thrombosis-emboli after "thrombosis-dangerous" operations at the Surgical Department of the Aker Hospital.
Definite cases.....
Definite and most probable cases ----------
Definite, most probable, and possible cases ——————

a rise in pulse or temperature of obscure origin. A similar classification was applied to thrombosis, the positive cases being identified by local findings of pain, tenderness, edema, cyanosis, venous markings, or a positive venogram. Figures 2 and 3 show a marked fall in the frequency of thrombosis-emboli after surgery in the war years with a rise thereafter.

The average thrombosis-embolism rate after "thrombosis-dangerous" operations at the two hospitals was about 20 per thousand for the entire period and was a little higher in women than in men. At both hospitals this rate rose with the age of the patient. The curves for the changes year by year ran a U-shaped course, starting at a high level in 1940, showing a rapid and marked fall during the war, and definitely rising thereafter, however, not to the original level.

Table 1 shows the frequency of thrombosis-emboli after different types of operations.

The thrombosis-embolism rate was definitely lower after operations on the appendix and for hernia, as these numbered 9,767 and were followed by thrombosis-embolism in only 10.9 per thousand. As these operations were more frequent during the war, they were tabulated in Fig. 4, which shows approximately

TABLE I.—NUMBER AND FREQUENCY OF CASES OF THROMBOSIS-EMBOLISM AFTER THE VARIOUS "THROMBOSIS-DANGEROUS" OPERATIONS AT BOTH HOSPITALS, IN BOTH SEXES AND FOR ALL AGES; 1940 TO 1948.

	No. of operations	No. of cases	No. of cases per 1,000 operations
Appendix operations	6,598	87	13.2
Hernia operations	3,169	19	6.0
Gastroduodenal operations	1,242	46	37.0
Intestinal operations	1,134	39	34.4
Biliary operations	442	27	61.1
Exploratory laparotomy and other operations	479	15	31.3
Uterus and adnexa operations	1,021	25	24.5
Kidney operations	480	21	43.8
Bladder and prostate operations	877	34	38.8
Total	15,442	313	20.3

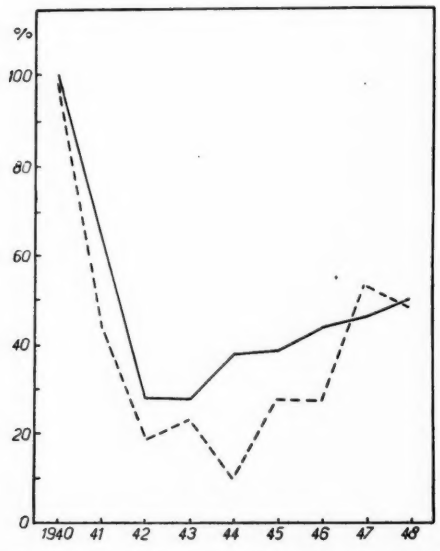

Fig. 4 (Jensen). Frequency of thrombosis-emboli after appendix and hernia operations and that of the other "thrombosis-dangerous" operations, 1940 to 1948, expressed as a percentage of the 1940 figures—both Hospitals.
Appendix and hernia operations ————————
Other "thrombosis-dangerous" operations ----------

the same decrease in the rate of the cases of thrombosis-embolism after all of the operations.

Attempts to link the fall in the rate to the duration of hospital confinement also failed to account for the decrease during the war. Nor could a satisfactory explanation be given by linking the errors of diagnosis or registration, the changes in hospital routine, or the age of the patient.

The caloric content of the diet in Norway fell from 3,470 to 2,849 during the war. It is known that thrombosis is seldom seen in areas of the world where the diet is a bare subsistence. The conclusion is reached, therefore, that the reduction in diet during the war with the consequent reduction in weight for large sections of the community was the principal factor in the relative infrequency of thrombosis-embolism during the war period. With the resumption of normal diet after the war, the frequency has risen and is still rising. E. D. BLOOMENTHAL, M.D.

Experimental Studies Correlating the Intracardiac, Jugular, and Vena Caval Pressures with Bronchoalveolar Pressures. (Ricerche sperimentali sul comportamento della pressione intracardiaca, nelle vene cave e nelle giugulari in rapporto alla pressione broncoalveolare). G. BRANCADORO and N. COCCHIA. *Chir. riv. pathologia clin. chir.*, 1952, 6:369.

The authors conducted a series of experiments in dogs correlating the pressure changes that occur in the superior and inferior vena cava and in the right ventricle with the changes in bronchoalveolar pressure during normal, controlled, and assisted respiration.

Under pentothal anesthesia, normal conditions were observed. With the aid of curare, the respirations were either artificially controlled or assisted and the observations were recorded. The latter experiments were conducted on open and closed chest preparations.

In normal respirations the rise in venous pressure that occurs during expiration is parallel to the rise in bronchoalveolar pressure. The immediate fall in bronchoalveolar pressure that occurs during inspiration is transmitted to the venous pressure by one-fourth of the time of the inspiratory phase. The venous pressure changes are simultaneously transmitted to the right auricle and ventricle. During artificial respiration (controlled or assisted) the inspiratory and expiratory bronchoalveolar pressure values are reversed. The pressure is increased during inspiration and decreased during expiration. The changes that occur in bronchoalveolar pressure are simultaneously transmitted to the vena cava and the right heart. The pressure changes correlated well when the bronchoalveolar tree was within the limits of expansibility. In closed chest preparations, when the bronchoalveolar pressure rises above the degree of pulmonary elasticity, the venous and right heart pressure rise sharply and out of proportion to the rise in bronchoalveolar pressures. Pressure increments up to 35 cm. of water in the right ventricle were observed. The authors found the critical bronchoalveolar pressure to be between 12 and 15 cm.

The authors conclude that these changes together with the relative cardiac tamponade that occurs during artificial respiration inverse the normal hemodynamics and reduce the cardiac output. These effects were more pronounced during assisted respiration than during controlled respirations, and in closed chest observations rather than in open chest observations. R. A. MANFREDI, M.D.

The Importance of Nutritive Dosages of Oxygen to the Higher Nerve Centers for the Mechanism of Action of Endocarotid Blood Transfusions in Hemorrhagic Shock; Experimental Studies (Importanza dell'ossigenazione a dosi nutritive dei centri nervosi nel meccanismo di azione della trasfusione endocerotidea di sangue nello shock emorragico; ricerche sperimentali). GUIDO CECCHI. *Ann. ital. chir.*, 1952, 29: 358.

The author has studied the mechanism of action of the endocarotid blood transfusion in an effort to clarify its well known favorable effects on the peripheral arterial pressure and on the pulse pressure in instances of hemorrhagic shock. In making these studies he injected into experimental normal and exsanguinated animals various concentrations of novocain solution, solutions of heparin, citrate of sodium, defibrinated arterial and venous bloods, arterial and venous whole bloods, 25 per cent of

albumin and, finally, pure oxygen and combinations of blood transfusion with oxygen.

The stimulative pressor effects on the nerve centers of weak (i.e., nontoxic) solutions of citrate of sodium and of novocain as above described, as well as the solution of 25 per cent albumin, were demonstrated; the effects, however, did not evidence the remarkable and enduring results obtained with the blood transfusions, especially with the hyperoxygenated arterial blood transfusions.

This last mentioned form of treatment was best of all and there were no deaths among the exsanguinated animals so treated. The blood was hyperoxygenated simply by bubbling the oxygen into the blood in a flask and then withdrawing the hyperoxygenated mixture from the flask and injecting it intra-arterially into the carotid artery by means of a two-way syringe. The method is perhaps best described by the report of a concrete example as follows:

A dog weighing 16 kgm. was anesthetized with morphine and narcovene. Normal arterial pressure was 125 mm. Hg. Blood (850 c.c.) was withdrawn and the pressure sank to 25 mm. Hg. With further small and repeated withdrawals of blood the state of minimal pressure (agonium mortis) was reached. Blood (100 c.c.) was then transfused intra-arterially into the carotid in the direction of the normal current (towards the brain); this blood was hyperoxygenated in the manner described. A good pulse pressure reappeared almost at once, the arterial pressure attaining up to 55 mm. Hg., and becoming stabilized at 40 mm. Hg. After a period of 20 minutes a second transfusion, identical with the first, was administered. Here the arterial pressure reached 70 mm. Hg. and persisted at this level. After a further 20 minutes the pressure had climbed to 100 mm. and persisted at this point without further oscillations.

In these studies, even the injection of oxygen alone sufficed in a surprising manner to revive the exsanguinated animal without the addition of blood. This oxygen must not be infused more rapidly than it can be absorbed by the blood stream or the brain tissues to which it is directed. The author believes, with Gayda, that the normal dog can consume in this manner 9.95 c.c. of oxygen per minute for each 100 gm. of brain tissue. The best results in these experiments were obtained in broken doses (rhythmic injections) of, say, 15 c.c. in 15 seconds, or 30 c.c. per minute, with 15 second intervals, for 3 minutes in succession.

The author believes that his findings in this series of experiments demonstrate the frequently proposed postulation that the peripheral disturbances of circulation and the failure of heart action in shock are largely of central origin, and that the failure to respond to efforts at revivication is the result of irreversible changes in the nerve centers of the midbrain. In his opinion these changes are due to the effects of anodynia and he considers it more important that these nerve centers be supplied with what he designates "nutritive dosages" of oxygen than that the blood volume be restored.

Further studies on this subject are in progress.

JOHN W. BRENNAN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Wound Ballistics and Body Armor. ROBERT H. HOLMES. *J. Am. M. Ass.*, 1952, 150: 73.

Wound ballistic study consists of an analysis of the effects of the various firearms and their missiles on human tissues, or tissues of experimental animals. As each new weapon is invented, its wounding properties must be carefully evaluated. There is necessity for the identification of varied weapons and missiles, knowledge of their velocities, configuration, mass relative incidence, and lethality. The comparative frequency of anatomic regional involvement and proper classification of wounds must also be known. It is essential to know precisely the identity and behavior of the agents or missiles that produce wounds, the circumstances of wounding, and the specific nature of the wound as well as any unique features of its repair.

Contrary to what many believe, without supporting data, most of the men who have been wounded have a fairly good idea of what hit them. Aside from those who are disoriented or moribund, less than 10 per cent of the wounded fail to state positively and rationally the identity of the wounding weapon. The list of weapons causing most wounds is not extensive; they may be divided into small arms and artillery. The mortality and morbidity of war wounds consequently depends on the wounding agent and the anatomic region involved. The relative morbidity of small arms fire to shell fragmentation is about one to four. The relative mortality of small arms fire to shell fragmentation is about two to one. It is noticed that in the present survey small arms fire accounted for about 65 per cent of the number of men killed in action, and shell fragments accounted for 35 per cent.

The implication for some form of body armor to be worn by field troops is simple and urgent. Reduction of the killed-in-action rate is the most urgent problem confronting field medicine. The possibilities of accomplishing this are few. The concept of body armor in warfare is a matter of history. The helmet has long been accepted as essential to the battle dress, yet wounds to the thorax account for almost as many men killed in action as do wounds to the head. Thoracic and abdominal wounds combined are known to account for about one-third of those killed in action, and the most recent survey indicates an even higher percentage.

From these observations, the need for body armor is apparent. The problem of providing body armor requires a co-ordinated effort by many branches of the military service, because the design of the body armor must be a compromise between the ideal in protection and the practical in use. The maneuver-

ability and effectiveness of the combat man must be preserved. In June, 1951, a joint Army-Navy mission was dispatched to Korea to conduct the first controlled field trial of body armor under combat conditions. The body armor, a thoracoabdominal vest weighing about 8 pounds (3.6 kgm.) and with protective qualities superior to those of the helmet in current use, was to be worn by combat medical personnel and other members of all the services. The field trial lasted for about 2 months, and troops of the First Marine Division and the Second Infantry Division were carefully indoctrinated in the use and value of the thoracoabdominal vest. On conclusion of the trial, it was reported that the vest was desirable, acceptable, and could be worn without undue encumbrance or hindrance to job performance. The psychological effect was also favorable. Much progress has already been made in the design of the vest, its production and its use in Korea under combat conditions. Although it is too early for final evaluation of its effectiveness, the Marines have recently standardized body armor as an official item of equipment, and both Army and Marines have extensive trials in progress in Korea and in experimental laboratories. It appears that body armor will provide another means of preventive medicine for the armed forces and will contribute to the total medical effort to conserve the fighting strength. STEPHEN A. ZIEMAN, M.D.

Crush Injury of the Hand Treated by Cortisone. STEWART H. HARRISON. *Brit. J. Plast. Surg.*, 1952, 5: 181.

Crush injuries of the hand produced by heavy machinery are followed by effusion into the palmar tissues. The effusion is replaced by fibrous tissue, infiltrating all tissue spaces and unsuitable for excision, with gross limitation of movement and loss of normal concavity of the hand. This fibrous tissue appears to remain immature for about 6 months and, in younger patients particularly, some absorption can be assisted through active exercise in an elevated position. Older patients are often left with a "frozen" hand.

A typical case was treated with cortisone, because of its effect on fibrous tissue. The 46 year old male patient had a degloving injury of the palm, parallel lacerations of the dorsum, and a laceration of the forearm. There was dislocation of the second, third, and fourth carpometacarpal joints, and a fracture of the fifth metacarpal neck.

The patient received systemic penicillin for 21 days, followed by a full course of chloromycetin. Two days after the injury he was given 100 mgm. of cortisone daily for 18 days.

Infection, due to the Staphylococcus aureus, was uncontrolled by the antibiotics and caused extensive destruction beyond the original injury. Operation was performed 1 month after the injury, at which time none of the fingers were viable and all had to be amputated. Only the thumb was saved. After this, healing was not delayed in spite of the presence of infection.

There is a discussion of the literature on ACTH and cortisone and their relation to wound healing. Although there was a consensus of opinion that cortisone delayed wound healing, only one author had found an increased incidence of infection.

Wounds had been found to heal under ACTH and cortisone therapy with proliferation of the epithelial structures, but there were no granulation tissues, leucocytes, fibroblasts, or proliferating blood vessels. The plasma ascorbic acid was lowered. It appears to the author that the effects of cortisone on local wound healing is that it produces exactly the status quo conducive to wound infection.

The author concludes that, in view of the reduction of fibroblastic action following cortisone administration, one might be justified in recommending cortisone in the disabling crushed hand syndrome, provided wound healing is accomplished prior to the administration of the drug. JEFFREY FERRIS, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Telepaque. WILLIAM H. SHEHADI. *Am. J. Roentg.*, 1952, 68: 360.

In searching for a better cholecystographic medium, Archer and Hoppe studied a series of aryl tri-iodoalkanoic acid derivatives which, owing to the presence of a third iodine atom in the molecule, promised to lead to denser radiopacity than the preparations now available. A new compound named telepaque which has the chemical formula of 3-(3-amino-2,4,6-tri-iodophenyl)-2-ethyl-propanoic acid was found to fulfill this requirement and, moreover, to have other distinct clinical advantages. Preliminary animal experiments revealed that this compound is about 1.5 times as effective as iodoalphionic acid (priodax) in visualizing the gallbladder, and that its toxicity following oral administration is only about one-fourth as great.

To test the validity of these advantages in the human, the author used telepaque in a series of 310 nonselected patients recently examined in the Department of Radiology at the New York Polyclinic Medical School and Hospital, New York.

The following are the properties of this new preparation: it is a cream-colored solid containing 66.68 per cent iodine by weight; it melts at 155–157 degrees C.; it is insoluble in water, but is soluble in dilute alkali and 95 per cent alcohol and other organic solvents; it appears in the gallbladder within 2 hours after oral administration, optimal visualization being obtained at about 10 to 12 hours; it is excreted more rapidly and completely than priodax.

Telepaque is prepared in 0.50 gm. tablets, 6 tablets being dispensed in one tube for a single dose. The author administered orally 6 tablets (3 gm.) in 250 cases, and 12 tablets (6 gm.) in 60 cases. He also examined concurrently a series of 120 cases with priodax (3 gm.) and started a parallel series with monophen (3 gm.), but soon discontinued this latter. The side reactions studied included nausea, vomiting, diarrhea, burning on swallowing, burning on urination, skin eruption, and pruritus, and were graded 1 to 4 plus, according to frequency and intensity. In interpreting the cholecystograms, the gallbladder shadow was evaluated as to size, density, and size after fat meal and likewise was graded 1 to 4 plus for each of these factors.

The examination was performed in the usual manner except that in the ambulatory cases the telepaque tablets were given at 9:00 o'clock the preceding evening as compared to 6:00 o'clock for priodax. In the in-patients it was found more convenient to give the telepaque tablets too at 6:00 o'clock, immediately after the low fat supper.

A compilation of the results obtained established the following advantages of the telepaque in cholecystography: (1) a decidedly low level of side reactions; (2) ready and rapid absorption, prompt response of the gallbladder to a fat meal, and rapid elimination from the system; (3) greater density and better visualization of the gallbladder; and (4) frequent visualization of the bile ducts.

The author, therefore, concludes that telepaque is superior to any of the contrast media used at the present time for cholecystography. The article is illustrated with reproductions of beautiful cholecystograms clearly supporting this conclusion.

T. LEUCUTIA, M.D.

Esophageal Perforations. BRIT B. GAY, JR. *Am. J. Roentg.*, 1952, 68: 183.

The etiological factors of acquired esophageal perforations and fistulas are reviewed; their clinical, pathological and roentgenological findings are discussed and representative cases are presented.

Primary (spontaneous) perforation of the esophagus is the most serious of all esophageal perforations. Through March of 1950 there had been 91 cases reported in the literature. No survivals were recorded prior to 1944. Since then, the relative number of survivals has been increasing significantly. The consensus is that this lesion results from a sudden increase in intra-abdominal pressure associated with spasm of the pylorus and cricopharyngeus muscles. Characteristically, the condition occurs in middle-aged men, usually alcoholics, following vomiting or ingestion of a heavy meal. It is usually mistaken for a perforated peptic ulcer and an emergency laparotomy is performed.

The roentgen findings usually observed have been the following: (1) hydro (pneumo) thorax on the left in 50 per cent of the subjects, on the right in 7 per cent, and bilateral in 25 per cent; (2) cervical or mediastinal emphysema (or both) in about 60 per cent; (3) mediastinal widening, occasionally in later stages, rarely in early stages; (4) lipiodol swallow demonstrating the site of perforation; (5) absence of subdiaphragmatic air, in all cases reported to date.

Entities to be differentiated diagnostically from spontaneous perforation of the esophagus are ruptured peptic ulcer, acute cholecystitis, pancreatitis, intestinal obstruction, perforated appendix, pulmonary infarction, coronary infarction, spontaneous pneumothorax, acute pleural effusion, and dissecting aneurysm.

The secondary causes of esophageal perforation and fistulas are: penetrating and caustic agents, neoplasms, chronic inflammatory diseases, peptic ulcers, diverticula, aneurysms, and breakdown of esophageal anastomoses.

The most frequent traumatic causes of secondary esophageal perforations are foreign bodies and instrumentation. Perforations of the upper esophagus are more frequently caused by foreign bodies. These lesions usually remain localized and consequently

offer a better prognosis. Perforation from this cause in the lower esophagus is rare. The roentgen signs consist of (1) regional prevertebral swelling of the soft tissues, (2) paraesophageal emphysema, (3) visualization of a radiopaque foreign body, and (4) lipiodol demonstration of fistula.

The presence of a neoplasm is the most common cause of esophageal perforations. Carcinoma of the esophagus is the most common of these lesions, but several other types of carcinoma and Hodgkin's disease have been reported as causative.

The most common inflammatory disease associated with esophageal perforation is tuberculosis. The roentgen manifestations associated with tuberculous mediastinitis include (1) displacement, (2) irregular mucosal pattern, (3) fistula from traction diverticula, (4) ulceration, (5) adherence of the esophagus to the bronchus, producing an oblique cylindrical filling defect, and (6) projections from esophageal lumen due to adhesions on the outside wall—these are constant in contrast to peristaltic waves.

A negative esophagram does not always rule out an esophageal perforation. EDWARD D. HUDACK, M.D.

Roentgenologic Exploration of Gastric Rugae with Reference to the Diagnosis of Gastritis. WENDELL P. STAMPFLI. *Radiology*, 1952, 59: 336.

A review of the literature on the subject of gastritis is discouraging in that roentgen methods have been considered inaccurate in the diagnosis of gastritis. For a study of the problem of gastritis, careful fluoroscopy is essential. Routine procedures need not be complicated by the introduction of balloons, gas-forming powders, or special barium preparations. Conventional exposures often disclose abnormality. Relief methods for studying the gastric mucosa are important.

The author's method is to have the patient swallow 1 ounce of a fairly thick barium mixture while standing erect in the right anterior oblique position. Turning the patient and manipulation of the stomach in this position are of value. Supine and oblique films are taken and the patient is returned to the erect position. This allows a good double contrast study of the fundus. An additional 7 ounces of thinner mixture is then ingested, and additional study in the standing, prone, and supine positions is done. Efforts to produce double contrast films are sometimes rewarding. The mucosal lining of the stomach is thrown up into numerous folds or pleats. The border rugae run along parallel to the lesser curvature from the true cardia to the pylorus. The more lateral of these cross the axis of the stomach obliquely and often produce shallow indentations on the greater curvature. The antral rugae vary in pattern. They may run in the direction of the lumen or obliquely with many irregular components. The pattern in the fundus is often irregular except at the level of the true cardia, where the folds of the esophageal orifice may radiate outward in a stellate manner. The appearance of the rugae in the same person change with different positions. The deformities of the stomach lining that appear secondary to inflammatory infiltration may be localized or generalized. With swelling of the mucosa, submucosa, or both, the rugosity of the stomach usually becomes more pronounced. The folds may be higher and the valleys between them deeper. The lining of the stomach may be so thick that it buckles into the lumen in a manner suggestive of polyposis or neoplasm, and in some extreme cases actual polyps may exist. Prolapse of the thickened redundant mucosa through the pylorus is common. Extreme thickening and rigidity of the stomach lining are sometimes seen without rugosity. A familiar characteristic of inflamed mucous membrane is hypersecretion. Since many apparently healthy individuals exhibit this, its presence is difficult to evaluate. Sluggish and ineffective peristaltic contractions may be noted in chronic gastritis.

Radiologists should continue to assemble data that will allow a comparison with the gross and histologic evidence which is obtained.

FRANK L. HUSSEY, M.D.

Contribution to the Roentgenologic Study of the Soft Parts of the Knee (Contributo allo studio radiologico delle parti molli del ginocchio). ADOLFO SACCHI. *Radiol. med.*, 1952, 38: 735.

During the past 6 months the author has made roentgenologic studies of the soft tissues of the knee in 50 patients. This was done without aeroscopy or arthroscopy of any kind, and with a soft tube (45 kv.) having a focal distance of approximately one meter, and the standard projections. In only a few instances were tangential films taken for a better exposition of superficial lesions of the capsule or ligaments.

In more than half of the cases in this series the lesion was traumatic (distorsions, direct trauma, fractures); in 15 cases the lesion was inflammatory in nature or degenerative in character (arthrosis) with involvement of the tissues of the joint itself; in 3 cases the inflammatory process involved the periarticular tissues; in 22 instances there was evidence of intra-articular effusion (here no distinction could be made between bloody pus and transudation fluid); in 12 cases the injury was to the ligamento-capsular apparatus; in 8 instances there were observed deposits of calcium in the intra-articular and periarticular tissues.

The effusions as a rule were most easily recognized by the characteristic ovoid shadow of increased density beneath the shadow of the quadriceps tendon and representing the suprapatellar recess of the joint cavity itself. In noninflammatory conditions this shadow was usually well delimited in the roentgenogram and did not obscure the other clear fields in this region.

The clear fields to be looked for about the knee joint are in the main, in the anteroposterior projections (Fig. 1), the femoroparametaphyseal projection, and, in the laterolateral projection (Fig. 2), the clear area beneath the quadriceps tendon in which

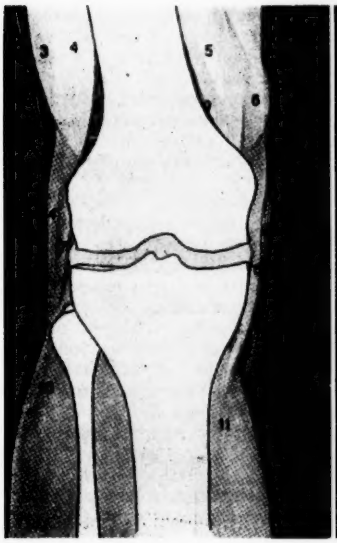

Fig. 1 (Sacchi).

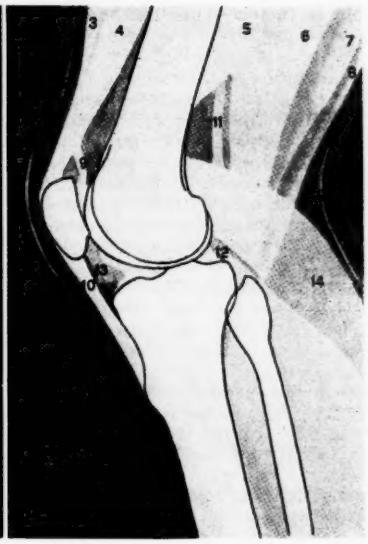

Fig. 2.

is visible in effusion of the joint the suprapatellar recess and the smaller clear area of triangular form just above the patella and comprising the remainder of the main transparency but separated from it by the shadow of the distal border of the suprapatellar recess. The mass of fatty tissue occupying the anterior portion of the joint space distal to the patella also presents a lighter area which is not much affected by any except chronic inflammatory processes, designated on Fig. 2 by the number "13." A less conspicuous view of this fatty tissue is also to be observed posteriorly and is designated "12" in Figure 2. Finally, there is observed the large clear area of the popliteal space, traversed by the vasculonerve shadow band of this region.

In inflammatory processes, these rather clearly delimited areas are apt to be obscured. In one instance a hemorrhagic laceration of the quadriceps could be recognized by the encroachment of the shadow of the hematoma upon the small triangular shadow above described. In the tangential views it was possible to see not only the capsular dehiscences, but in some instances the quadrangularly contoured shadow of the articular cartilage could be seen projecting beyond the medial contours of the joint, and the protrusion (light area) of the fatty body of Hoffa through a dehiscence in the capsule to beneath the skin region (subcutaneous invasion).

The purpose of the author in presenting this series of roentgenographic reproductions and the appended discussion was to call to the attention of the profession the possible advantages to be had with this method in medicolegal cases.

JOHN W. BRENNAN, M.D.

The Sieve in Radiotherapy. B. JOLLES and R. G. MITCHELL. *Brit. J. Radiol.*, 1952, 25: 395.

The authors, factually and theoretically, appraise the problem of a new field in radiotherapy, i.e., the use of the sieve (a shield with circular or square apertures). The principle involved is that by fractionating (both spatially and temporally) the dose of radiation, one is able to increase the therapeutic radiation dosage within the diseased tissues while, at the same time, causing less destructive effects in the normal tissues surrounding the tumor.

With this technique (described in detail and illustrated as to minute technical matters), much larger doses than with conventional therapy can be administered because the skin can tolerate the higher dosage of radiation when it has been fractionated.

In the cases observed, reactions of the skin and mucous membranes were much less, in spite of the conventional total doses. Results are not tabulated, but in the small number of cases studied the results were good.

The recurrence of tumors was not discussed, but should they recur further therapy would be far better tolerated since the skin would be in a better condition than after conventional therapy. The authors believe that a reappraisal of the dosage schedules now in use will be necessary.

A discussion of the calculated dosage beneath the sieves is presented and it is seen that even though the radiation is composed of divergent rays, the sieve pattern is continued even in the deeper tissues. No area escapes irradiation. Calibration charts for the range of applicators are included as well.

HAROLD M. UNGER, M.D.

Roentgen Therapy in Cancer of the Extrathoracic Portion of the Esophagus. BERTEL JÖRGSHOLM. *Acta. radiol.*, Stockh., 1952, 38: 61.

A review of the literature on the roentgenological treatment of carcinoma of the cervical esophagus reveals a somewhat varied experience with generally poor results. The best results to date appear to have been obtained in Sweden where there is a preponderance of the disease in females (60%). This female preponderance in Sweden appears to be related to the common occurrence of the Plummer Vinson syndrome among the female rural population in Sweden. Jacobson at Radiumhemmet, Stockholm, Sweden, reported 17 per cent of 5 year survivals during the period 1943–1945. On the whole, results for the cervical portion of the esophagus appear to be only slightly better than those reported for the intrathoracic portion.

Despite recent technical advances, resection of the cervical portion of the esophagus has resulted in very few 5 year survivals. Possibly, radical bilateral dissection of the cervical lymph nodes will improve these results.

The author presents a series of 109 patients with carcinoma of the cervical esophagus seen at the Radium Center in Copenhagen during the period 1931–1944 inclusive. Females comprised 43.1 per cent of the group and their average age was 59.5 years. The average age of the males was 67.3 years.

There was an average duration of symptoms prior to medical consultation of 3.1 months with an average of 4.6 months elapsing from this time until the patient was referred for therapy. The symptoms consisted of dysphagia (90%), weight loss (70%), pain in the throat (50%), hoarseness (29%), regurgitation (34%), and cough (20%).

In 52 of the 109 cases the tumor was situated at or in the vicinity of the pharyngeal opening and was demonstrable in part by laryngoscopy. In women, 63 per cent occurred at the postcricoid area whereas, in males, 75 per cent were at the jugular notch.

Metastases were present at the first examination in 40 per cent, mainly in the form of palpable cervical and supraclavicular lymph nodes. Four patients also exhibited pulmonary metastases. When clinical findings and autopsy material were combined, 49.5 per cent of patients exhibited metastases at the time of death.

Microscopic proof of tumor was present in 90 of the cases. In the remainder, the clinical course was believed to be typical. The majority were squamous cell carcinomas, but the cell type seemed to have no relationship to prognosis.

Only 67 patients received a complete fractionated roentgen treatment. Known metastases were present at the time of treatment in 25 of these patients. Treatment was individualized and the calculated total tumor dose ranged from 3,200 to 10,200 roentgens administered in the course of 21 to 98 days through ½ mm. copper or a Thoraeus filter, focal-skin distance 50 to 70 cm., 165 to 180 kv., to 2 to 7 fields (6 by 8 to 10 by 15 cm). The daily dose was 100 to 200 roentgens in 1 or 2 daily sessions. Eight of the patients received rotation therapy.

The 5 year survivors received tumor doses ranging from 3,800 to 6,400 roentgens over a period of 22 to 56 days. An increase in the tumor dose did not seem to increase the curability.

At the end of 1 year, 83 patients had died from esophageal carcinoma. The 5 year result showed 8 patients alive and symptom-free, 97 patients dead from carcinoma of the esophagus, and 4 dead from other diseases.

Perforation of the esophagus occurred in 4 cases during treatment. Seven patients had to undergo gastrostomy during treatment because of increasing dysphagia. Cicatricial stricture developed in only 3 cases, however. GLADDEN V. ELLIOTT, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Dupuytren's Contracture (Consideraciones sobre la enfermedad de Dupuytren). P. PIULACHS and L. MIR Y MIR. *Fol. clin. internac.*, 1952, 2: 339.

The author discusses the pathogenesis of Dupuytren's contracture, incriminating a fibrous diathesis as its basis. Initially, fibrillary ruptures occur followed by hemorrhage and increasing fibrous hyperplasia. Eventually, the elastic fibers of the skin are replaced by collagenous tissue which causes further contractures and immobility. Subsequently, in advanced cases, osteoarthritis and ankylosis aggravate the clinical picture.

Of the myriad procedures advocated for surgical relief, the only one that produced consistent beneficial results was complete extirpation of the palmar aponeurosis including its extensions over the lumbrical arches or wherever else it was involved, and extirpation of the overlying skin which was replaced by a sliding graft of the hypothenar area and completed by a free, full-thickness graft taken from the abdomen. This is applicable when the ring finger is involved. In case the little finger is afflicted, the dorsal cutaneous flap of Bruner is recommended.

Medical therapy with cortisone and vitamin E has been ineffective in progressive cases.

MIGUEL DROBINSKY, M.D.

Malignant Synovioma. C. J. E. WRIGHT. *J. Path. Bact.*, Lond., 1953, 64: 585.

The author reviewed microscopic sections and case histories collected in his laboratory between 1910 and 1949 and found 23 cases of malignant synovioma in addition to the previously reported 24 cases found between 1936 and 1949.

A review of the histology and case histories indicates that the prognosis depends upon the degree of cellular differentiation. The classification was:

A. Nongiant cell type (42 cases)
   a. Well differentiated: 3 cases, all patients survived more than 9 years
   b. Poorly differentiated: 1 long term survivor
B. Giant cell type (3 cases)
   a. Well differentiated: 2 long term survivors
   b. Poorly differentiated: 1 patient died several months after diagnosis
C. Combined type (2 cases)
   a. Poorly differentiated: both patients died less than 1 year after surgery.

The procedure of choice for a suspected lesion is biopsy. If histological differentiation is good, wide local excision is indicated. Amputation should be done if there is poor cellular differentiation.

Photomicrographs of the cellular types are described.

ROBERT L. CRAIG, M.D.

The Colloidal Red Test (La prova del rosso colloidale). G. MONTI and G. ILLING. *Policlinico, sez. chir.*, 1952, 59: 193.

The authors report the results of further investigations concerning the colloidal red test of Ducci. During previous studies they had observed that a state of serum lability in certain patients resulted in the positivity of the above mentioned reaction. Ducci's test, furthermore, was found more sensitive than the other flocculation tests. The main point of interest of the present article lies in the comparison of the serum protein levels and their fractions with the results obtained by the colloidal red test.

The study was made on 100 thoracic surgical patients with various neoplastic as well as inflammatory lesions. A Ducci test was performed in all instances, and the authors observed a definite relation between the positivity of the test and the increase in the globulinic fraction of the serum proteins. This fraction is called labile and appears to be alpha-globulin in patients with suppurative and exudative tuberculosis, but gamma-globulin during the productive stage of the latter disease. In regard to the patients with pulmonary malignancies, it can be said that there is a certain parallelism between the positivity of the test and the increase of the labile serum protein fraction. However, no statement is made as to what fraction of the globulin appears to be affected.

The colloidal red test is considered as a valuable addition to the arsenal of hepatic function tests and should receive more attention especially because of its great sensitivity as an indicator of imbalances within the blood proteins.

The technique of the test is described in detail.

R. SCHOBINGER VON SCHOWINGEN, M.D.

EXPERIMENTAL SURGERY

Effect of ACTH and Cortisone on Thyroid Function (Accion de la adrenocorticotrofina y de la cortisona sobre la funcion tiroidea). ALBERTO B. HOUSSAY. *Rev. as. méd. argent.*, 1952, 66: 132.

Thyroid function was studied before, during, and after the administration of ACTH, cortisone, and compound F to patients with skin or joint disease but with normal thyroid and adrenal functions, and in patients with Cushing's disease. Studies included (1) the uptake of radioactive iodine by the thyroid 48 hours after its administration, (2) the 48-hour urinary excretion of radioactive iodine, (3) the time curve obtained with a lead-protected Geiger counter at the neck, and (4) the level of protein-bound iodine in the serum.

Four of the 5 patients receiving intramuscular ACTH, 40 to 100 mgm. daily, showed a marked decrease of radioactive iodine uptake by the thyroid and an increase of urinary radioactive iodine,

and at least one patient showed a fall in the level of protein-bound iodine. No significant changes were observed in one other patient receiving ACTH, nor in any of the 4 patients receiving cortisone acetate, 100 to 200 mgm. daily. Radioactive iodine uptake decreased in one patient receiving compound F for 8 days.

In 2 patients with Cushing's disease (one with active disease, the other in remission) radioactive iodine uptake by thyroid was normal, and in a third patient it was diminished; the protein-bound iodine level was normal in the latter. Radioactive iodine uptake increased markedly 14 days after removal of adrenocortical tumor in one of these 2 patients with Cushing's disease, whereas in the second patient it remained unchanged although adrenal hypofunction became marked. JONAS BRACHFELD, M.D.

The Influence of Posterior Hypophyseal Extract on Renal Function (Influenza dell' estratto ipofisario posteriore sulla funzionalita' renale). A. BONANOME and R. BEGANI. *Ann. ital. chir.*, 1952, 29: 449.

The authors studied the antidiuretic effect of posterior hypophyseal extract upon normal patients, on others with polyuria, organic kidney disease, and postoperative patients.

Forty patients were subjected to these studies. The method employed was that recommended by Lasio. A retention catheter was placed and the bladder emptied. The amount of urine for the next hour was then measured. Ten milligrams of posterior hypophyseal extract (Richter) were then given. The urine was collected at hourly intervals for the next 2 hours, the amount recorded, and the specific gravity and the chloride content of each sample determined. The blood urea was determined during this time. The patients were kept in bed and no water or food was given.

The conclusions arrived at were that while the functional capacity of the tubules could be measured in this manner, the values in organic disease were difficult to assess. If the patients had oliguria the values obtained were not sufficient to measure the changes caused by the extract.

The changes induced in the postoperative state were inconstant and of short duration. It is believed, from these results, that one could use the extract in postoperative patients with oliguria.

LUCIAN J. FRONDUTI, M.D.

The Use of Radioactive Iodinated Human Serum Albumin in Evaluating the Peripheral Circulation. HARVEY KRIEGER, JOHN P. STORAASLI, WILLIAM J. MACINTYRE, WILLIAM D. HOLDEN, HYMER L. FRIEDELL. *Ann. Surg.*, 1952, 136: 357.

Methods hitherto used to evaluate the circulation in peripheral vascular disease are subject to considerable technical error and variation, having both physiologic and external environmental factors which may be difficult to control and interpret. Radioactive isotopes have been employed for estimation of the peripheral circulation for the past 25 years. A new method for studying peripheral circulation is presented. It includes the use of radioactive albumin, which remains in the circulation during the period required for the study.

This method measures directly the intravascular radioactivity, and eliminates factors that determine the rate of diffusion of electrolytes across a membrane. The equilibration curve which is obtained is a function of peripheral blood flow. The level on the ordinate, at which equilibrium is reached, is, in general, a function of the volume of the blood within the capillaries surveyed by the counter.

The equilibration curve has been approximated mathematically. Experiments have been performed to study modifications of the curve as various factors were altered.

The method has been applied clinically in the study of 40 patients with peripheral vascular disease, with respect to circulatory impairment, selection of patients for operation, and the results of therapy. SAMUEL KAHN, M.D.